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"But it is a great thing, let me tell you, to understand the imperfections of our knowledge, and so to analyse its defects as to be made aware what parts of a subject still remain (as it were) in the shade, and need to be brought into clearer view by the light which future observation may bestow upon them."

So wrote Latham of the diseases of the muscle of the heart in 1845. To-day some of his problems have been solved, some are still undecided, and some still remain in the dark of midnight.

### Causes of Fibrosis.

It is a long time since Morgagni recorded the first case of fibroid heart, and it was 100 years later before its causes were appreciated. The old nomenclature "chronic interstitial myocarditis" reflected the earlier views of its causation, and it was only in the eighties of last century that Weigert (1880), Charlewood Turner (1881), and Martin (1881) directed attention to its association with disease of the coronary arteries. The influence of syphilis had already been made known by Ricord (1845) and Virchow (1859). These three causes—myocarditis, ischæmic necrosis, and syphilis—are the chief causes of fibrosis. The other causes—tumour, tubercle, hydatid disease, wounds, and trauma—are of rare occurrence.

In fibrosis of the heart the new formed connective tissue is never uniformly distributed throughout the heart, but is scattered in little islets or bands throughout the muscle. Sometimes only a single patch is present, but most frequently the foci are multiple, and they may be numerous. Their shape varies. They may be rounded, oval, or star-shaped, or a long ribbon of varying thickness. The margins of the patches are always ill-defined and merge gradually into more or less normal muscle. The patches are of all sizes, sometimes mere pinpoints, sometimes blocks even an inch in diameter.

Fibroid patches are most common in the left ventricle though they may be found anywhere. The musculi papillares are most frequently affected, the papillæ becoming shrunken and deformed. The lower third of the left ventricle, the adjacent parts of the septum, and the posterior wall of the left ventricle about the junction of its upper and middle thirds are the next most common sites. On the right side the musculi papillares and the lower part of the ventricle are most frequently involved. The patches may, or may not, extend to the endocardium and pericardium. As a rule they are situated deeply, and do not reach the surface, but if the lesion is gross the overlying endocardium is always thickened, and less frequently the visceral pericardium. In lesser lesions one or other may be involved. If a large area of the wall is affected it is usually thinned, and may measure only a fourth of the normal thickness. But the whole of the muscle cells never completely disappear, a few cells along the endocardial and the pericardial surfaces persisting, being kept alive by the endocardial blood or the superficial circulation.

* The St. Cyres Lecture delivered at the National Hospital for Diseases of the Heart on June 4th, 1930.



#### ACUTE MYOCARDITIS.

The acute lesions found in the myocardium are varied. In acute infective endocarditis, and pyæmic conditions generally, infective embolism may occur, but the lesions are generally minute because patients with infective myocardial lesions die early. The foci may be due to a direct spread from an infected valve or patch of mural endocarditis, or to dissemination of infected blood through the coronary arteries.

Non-suppurative foci are of common occurrence, especially in cases of rheumatic endocarditis. The nodules are small and invisible to the naked eye. They are most common in the ventricles, especially the left, and are often situated in the vicinity of, or around, an arteriole. The essential lesion is a round-celled infiltration of the tissues. These cells may be few in number, and the adjacent muscle apparently normal; but if they are numerous they infiltrate between the muscle cells which in such case are degenerate. Occasionally they surround a tiny area of necrotic muscle. In most cases the foci are discrete and perhaps widely separated from each other, but the infiltration may be diffuse and larger areas involved. Muir suggests that in some cases the lesion is a focal necrosis of muscle cells, followed by a connective tissue reaction, while in others inflammatory foci around the blood-vessels destroy the adjacent muscle cells. In any case the ultimate results are the same.

In some instances the vessels are similarly affected, an arteritis or phlebitis occurring, often accompanied by thrombosis. The lymphatic channels, too, may be blocked by masses of cells. In later stages islets of connective tissue can be seen surrounding the arteries, and spreading for a variable distance between the adjacent muscle cells.

These myocardial lesions are not confined to cases of rheumatic disease, or indeed to cases of endocarditis. They have been found in many acute infections—pneumonia, pleurisy, diphtheria, sepsis, small-pox, enteric fever, scarlatina, blackwater fever—but they are much more common in the former diseases.

#### THE ISCHÆMIC FIBROSES.

A large group of cases of fibrosis are caused by interference with the blood-supply through the coronary arteries, which, as is well known, are frequently affected by pathological processes, and almost always show some change after middle life. The orifices may be affected in disease of the aorta, and plaques of atheroma, endarteritis obliterans, and diffuse thickenings are common in the larger and the smaller trunks. In many instances the lumen of the affected vessels is narrowed or blocked, and the corresponding muscle cells are more or less starved. But this is not invariable.

The coronary circulation is peculiar to itself. The two main arteries anastomose with each other at their extremities, and a similar anastomosis obtains between their main descending branches. The terminal vessels also communicate freely with each other, and the capillary network around the muscle cells is large and ample. But although this is so interference with the blood-supply through one vessel is seldom sufficiently compensated by anastomotic developments, and some damage to the muscle as a rule results. I have, however, seen at least five cases in which blocking of one of the main arteries was well compensated by enlargement of the other, and only

a few small patches of fibrosis were found on microscopic examination. Campbell has shown in radiograms of injected hearts the great amount of anastomotic development which may occur in these cases and thus obviate, in large measure, the results of occlusion of an artery. He points out, too, that the distribution of the coronary arteries is very variable, and that the blood-supply of any part may be derived from different arteries in different cases, so that the results of occlusion of a given artery are not constant. The neuromuscular tissues in particular are so lavishly supplied with alternative anastomotic possibilities as to explain the infrequency of blocks in ischæmic disease. But an adequate anastomosis is exceptional; fibrosis, of greater or lesser degree, is the common result of occlusion.

Even in the limbs the possibilities of anastomotic developments are considerable. One of our patients who was suffering from subacute bacterial endocarditis had a rigor on the evening of Nov. 6th, and complained of pain in the chest and the left forearm. Next morning the left arm was rather cold and slightly blue, the colour taking eight seconds to return after pressure upon it as against three seconds in the other hand. The radial pulse was imperceptible and the left subclavian artery was tender and blocked, just beneath the outer end of the clavicle. Two days later the hand was quite warm and the return of blood after pressure more rapid. The artery remained completely closed, but there were no signs of gangrene before his death on Nov. 23rd.

The possibility of effective anastomotic developments depends largely upon the rate of closure of the vessel. If the closure is sudden necrosis results, the area involved varying in size according to the artery concerned. If the closure is gradual some anastomotic developments can take place. In the first case infarct results. In the second some muscle cells undergo ischæmic atrophy while the "less noble" connective tissue survives. In the first case the scar is isolated and massive; in the latter small, paraarterial in site, and perhaps multiple. In infarct, too, hæmorrhage may take place into the softened tissues, and rupture ensue; or, if the wall survives but is weakened, aneurysmal dilatation may occur.

### SYPHILITIC LESIONS.

The typical syphilitic lesion is the gumma, but it is rare. Gummata vary in size from microscopic lesions to tumours as large as a pigeon's egg. They may be single or multiple, and may occur anywhere. A diffuse fibrosis, subacute interstitial fibrosis, has been found in the secondary stages of syphilis in the adult, and more frequently in infants and young children in congenital syphilitic disease.

But the most important and the most frequent sequel of syphilis is due to syphilitic disease of the coronary arteries and ischæmic fibrosis. The arteries may be narrowed or occluded at their orifice by a syphilitic plaque in the aorta, or in their course by a specific endarteritis obliterans. Infarct or paraarterial fibrosis results. The ultimate muscular lesions are not specific, though they own a specific cause.

## Recognition of Myocarditis.

The symptoms in myocardial disease follow fairly closely their pathological origin. They vary, of course, in different cases, for in some instances the cardiac lesions are merely part of a general arterial disease which has hit first or most severely another branch of the arterial tree; while in others they are the essential feature. They vary in their mode of onset. If a vessel is suddenly occluded the onset of symptoms is abrupt, while it is insidious if the lumen is slowly narrowed. In some cases a progressive narrowing is succeeded by a sudden thrombotic closure, and an acute exacerbation follows on a chronic train of symptoms. Thrombosis, too, may occur within the cardiac cavities, and embolism, anywhere, may suddenly alter the clinical picture. Often pericarditis ensues, and, though usually a subsidiary affair, may even dominate the scene. Sometimes, too, the primitive tissues of the heart are hit, the intrinsic mechanism of the heart is deranged, and a change of rhythm (e.g., heart-block) imparts its special feature to the clinical syndrome.

The dramatic attacks of ischæmic disease of the myocardium contrast strongly with the complaints of acute myocarditis. In the former, pain is often a striking symptom, the onset is sudden, and the most serious symptoms immediately precede death. In the latter, pain is exceptional unless pericarditis supervenes; the onset is generally insidious; and serious symptoms may occur early in the illness. In acute myocarditis, too, its symptoms are masked in great measure by the symptoms of the primary illness, and can only be differentiated with difficulty.

Acute myocarditis is most common in cases of acute endocarditis, whether of rheumatic or other origin, and in diphtheria, though it may obtain in almost any infection. In the infections as a whole the granular, fatty, and hyaline degenerations which are constantly present in the heart, are largely responsible for the cardiac asthenia, and although one might infer a priori, from our pathological knowledge, that myocarditis is present in every case of acute endocarditis actual evidence of its occurrence during life is only afforded by the appearance of some disturbance of the cardiac rhythm, sign of interference with the intrinsic mechanism of the heart. We know, too, that arrhythmia is often due to functional or nervous derangements, and that the heart-blocks alone are definite evidence of myocarditis. In a few cases the occurrence of a nodal rhythm, or progressive cardiac failure without obvious cause, afford presumptive evidence of its presence.

The first cases of heart-block in acute disease were recorded by Jellinek and Cooper (gonococcic endocarditis), James (malignant endocarditis), and Gerhardt (enteric fever with arthritis) in 1908; and two years later Magnus Alsleben reported its occurrence in diphtheria, a disease in which it has been frequently observed.

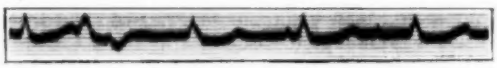
The occurrence of heart-block in myocarditis is occasionally accompanied by the Adams-Stokes syndrome; in a case of this kind in Sinai during the war, in a patient who was suffering from diphtheria, the attacks were numerous. But this is unusual; cardiac symptoms alone are the rule.

A man, aged 40, was taken ill seven weeks before admission into hospital with a typical attack of rheumatic fever. He remained in bed for a fortnight and at once resumed work, but after a few days had a recurrence of his arthritis and was again confined to bed for a fortnight. He again resumed his work, but three days later, while dressing, he was seized with acute pain beneath the sternum accompanied by breathlessness and palpitation, and collapsed. When admitted into hospital a fortnight later he was very breathless and pale with a small irregular pulse which numbered about 66 per minute. The heart was dilated, the liver large and tender, and the bases of the lungs congested. He died next morning. An electrocardiogram showed full heart-block, the auricles running about 78 and the ventricles at 59, their regular rhythm being interrupted at intervals by right ventricular extrasystoles (Fig. 1). The post-mortem examination showed the explanation of the block. The mitral cusp of the aortic valve was involved in an acute inflammation which had spread deeply, affecting the adjacent parts of the anterior mitral cusp, producing a small aneurysmal pouch, as well as the adjacent parts of the interventricular septum. Spreading through the septum it had infected the septal cusp of the tricuspid valve. As the lesion involved the septum immediately behind the undefended space the bundle of Kent must have been directly affected.

### A partial block is more common.

A man, aged 21, was admitted into hospital suffering from rheumatic fever of two days' duration. His pulse was quite regular and of fair value, but during the night it became irregular and less frequent, 84 against 110 on admission. Electrocardiograms showed a partial heart-block, every third auricular beat failing to evoke a ventricular contraction. Next day the pulse numbered 70 and was still irregular but the missed beats were less frequent. On the day after the pulse was regular and numbered 80, each auricular beat being followed by a ventricular contraction, and the P–R interval measured 0·22 sec. Two days later the pulse was occasionally irregular, the P–R interval measuring about

FIG. 1.



Full heart-block with one extrasystole.

0·24 sec., and some ventricular contractions failing. The pulse subsequently was always regular, and the P–R interval soon returned to normal limits.

### Still more frequently a latent block is shown on examination, the pulse remaining quite regular.

One of our patients who died at the age of 26 from acute endocarditis showed during life a regular pulse which invariably exhibited a prolonged a-c interval of about 0·25 sec. Post-mortem examination showed an early interstitial myocarditis, the muscle cells in some of the patches being degenerate. The a-v node was congested but otherwise normal. The bundle was involved in three places in inflammatory foci similar to those found elsewhere.

Block of these varying degrees is not uncommon in acute rheumatism. In our series of 428 cases of acute rheumatism block was *recorded* in 13.

The diagnosis of bundle branch block is only possible by electrocardiography, for, unlike heart-block, it gives no sign of its occurrence by alterations in the rate and regularity of the pulse. Its incidence is, in consequence, not yet fully recognised. It is most commonly found in patients who are suffering from chronic myocarditis, the result of ischæmic fibrosis. The left branch with its ribbon-like form and its ample blood-supply, derived from both coronary arteries, is but seldom affected, while the right branch, a slender strand, supplied by the anterior septal branches of the left coronary artery, and occasionally by the ramus cristæ supraventricularis, a branch of the right coronary artery, is more often found to be defective. Mural endocarditis is rarely present on the right side of the heart, and bundle branch block is rarely due to myocarditis. In the only case in which myocarditis seemed the probable cause, the patient was a man, aged 51, who had had an attack of acute rheumatism a few months before accompanied by aortic valvular disease. The block persisted until his death six years afterwards.

In three cases a temporary block has been recorded, which suggests that the cause may have been a myocarditis. In Lewis's case the block was present during a febrile attack; in Ritchie's case when the patient was jaundiced; and in Hewlett's case when the patient was suffering from urinary sepsis. We must remember that blocks may be produced by such drugs as digitalis, aconitine, and muscarine, and so presumably by toxic causes, without definite structural disease; but their influence is generally transient. In the absence of such intoxications, and the presence of an acute endocarditis, the existence of acute myocarditis may be fairly assumed.

### NODAL RHYTHM.

Nodal rhythm may be produced in experiment in two ways—by throwing the sino-auricular node out of action, thus permitting the auriculoventricular node to become dominant and to regulate the action of the heart; and by enhancing the activity of the auriculoventricular node, so that superseding the sino-auricular node it sets the pace of the heart. In the first case the rate of the heart is slowed; in the second the rate is increased.

Clinically three groups of nodal rhythm may be distinguished. In one paroxysms of nodal tachycardia occur from time to time; in another the cardiac rate is infrequent or but slightly increased; in the third the pulse-rate is persistently rapid. The first group are manifestly due to functional causes; the second occur under diverse conditions, sometimes in patients who are not labouring from any cardiac disorder; the third are sometimes associated with myocarditis. In one case a continuous nodal rhythm was present for a month before death, the pulse-rate ranging between 110 and 140, with a regular rhythm.

The patient was a woman aged 27 who had suffered from acute rheumatism in 1909 and 1910. The second attack was severe and prolonged, but she made a satisfactory recovery. A year later she gave birth to a healthy baby, and four months later a third attack of rheumatism ensued. She returned at once to hospital, seriously ill with arthritis and pneumonia. Her progress was unsatisfactory, the fever persisting and congestive failure appearing. She died two months later from cardiac failure. Post-mortem examination showed an adherent pericardium and chronic endocarditis of the aortic and mitral valves, an acute endocarditis being present on both these valves and also on the tricuspid valve. An extensive fibrosis was present in the muscle, spreading from the mitral valve into the auriculo-ventricular node, in which there were many fibroblasts and round cells. The lesions found were evidently of different ages, the older ones perhaps dating from the illness of 1910, though no direct evidence of myocardial mischief was elicited at that time. The more recent lesions, too, were evidently of some standing, as the fibroblasts in the cellular infiltrations were numerous, a fact which may be correlated with the appearance of the nodal rhythm a month before death. The earlier tracings were of sinus character.

In the records of six cases of this kind, in which microscopic examination of the muscle showed inflammatory lesions in the auriculoventricular node, three of these patients were suffering from acute rheumatism and three from infective endocarditis.

Progressive cardiac failure, *without obvious cause*, is always suggestive of myocardial lesions, which in some cases may be assumed to be inflammatory in nature.

A man, aged 22, died in our wards in May, 1920. He had had rheumatic fever in 1911 and 1914, and had made a good recovery, though left with a mitral leak. He worked regularly throughout the war, but in the spring of 1919 he undertook rather arduous work and cardiac symptoms soon supervened. He re-entered the ward in May, 1919. At this time he had some bronchitis, and his auricles were fibrillating, but steadily improved on the subsidence of the catarrh and the administration of adequate doses of digitalis. In December he was walking four miles daily for recreation. In January, 1920, he caught cold and all his symptoms returned. As the pulmonary lesions improved his discomforts lessened, and he was able to walk about the ward. But the improvement was evanescent, and in April it was clear that his heart was failing. He died in the middle of May.

There was no obvious immediate cause for the fatal termination. His symptoms in the spring of 1919 had been associated with excessive physical exertion, and in the beginning of 1920 with bronchitis. But none of these were active in March, April, May, though the cardiac failure was progressive, and his heart steadily dilating. His age and the state of his arteries negatived ischæmic fibrosis, and the probable cause of the progressive failure seemed to be myocarditis, the sequel of a subacute endocarditis. Post-

mortem examination showed the correctness of the assumption, a gross chronic lesion of the mitral valve being found with slight acute lesions of the mitral, aortic, and tricuspid valves, and widespread acute and subacute myocardial inflammation.

## Clinical Features of Ischæmic Fibrosis.

The symptoms of ischæmic fibrosis differ from those of myocarditis. The dominating symptom is cardiac pain, though pain is not invariably present; the onset of the symptoms is usually sudden; and death *may* occur suddenly at any time without warning.

### ANGINA PECTORIS.

The current theory of angina pectoris is a revival of an old idea which was first formulated by Allan Burns in 1908, and has been elaborated from the experimental side by J. A. MacWilliam (with W. J. Webster), in 1923, and from the clinical side by C. S. Keefer and W. H. Resnikinin 1928. According to this theory angina is the result of anoxæmia of the heart—a physiological conception, not an anatomical finding.

Allan Burns's statement may be quoted :—

"In health when we excite the muscular system to more energetic action than usual, we increase the circulation in every part, so that to support this increased action the heart and every other part has its power augmented. If, however, we call into vigorous action a limb round which we have, with a moderate amount of tightness, applied a ligature, we find that then the member can only support its action for a very short time, for now its supply of energy and its expenditure do not balance each other; consequently, it soon from a deficiency of nervous influence and arterial blood fails and sinks into a state of quiescence. A heart, the coronary arteries of which are cartilaginous or ossified, is in nearly a similar condition. It can, like the limb begirt with a moderately tight ligature, discharge its functions so long as its action is moderate and equal. Increase, however, the action of the whole body, and along with the rest that of the heart, and you will soon see exemplified the truth of what has been said; with this difference that as there is no interruption to the action of the cardiac nerves the heart will be able to hold out a little longer than the limb."

MacWilliam approached the question from the experimental side. He applied a tourniquet to the arm and noted the results: (*a*) so long as the forearm muscles remained inactive; and (*b*) when these muscles were thrown into action. As he found that the symptoms might, in part, be due to turgescence of the limb if the constriction was applied suddenly, he made the limb ischæmic by means of an elastic bandage, applied first to the fingers and the hand, and only removed after the tourniquet had been applied.

In a limb thus treated and kept *immobile* no notable result followed for the next 20 minutes, save for some coldness in the parts, an inclination to shift the position of the arm, and a certain amount of discomfort at the site of the constriction. Muscular activity of the forearm muscles, however, rapidly produced notable discomforts. Fatigue, as measured by the number of contractions executed within a given period, and their force, was readily produced, the fatigue point being reached in half or one-third of the time required in the normal limb. The forearm, too, rapidly became painful, and as the fatigue point was approached, so acutely painful, that the desire for relief became urgent. Cessation of the exercise, too, did not relieve the pain, which only ceased after relaxation of the constriction and the advent of fresh blood to the ischæmic muscles. Though relief of pain was thus readily afforded, fatigue was still apparent, and only passed off after some interval of time.

"It need hardly be pointed out," said MacWilliam, "that the foregoing observations have a close bearing upon the problems associated with the production of pain in angina pectoris, showing as they do how readily acute pain can be excited in skeletal muscles working with lack of blood-supply, the pain developing while the contractile power, though to some extent weakened, is still sufficient to execute movements of considerable force and energy—that is, long before complete fatigue."

Comparable experiments occur from time to time in clinical work. We are all acquainted with the pain of intermittent claudication, the sudden gripping of the calf muscles and the weakness of the legs, which ensues in patients with narrowing of the arteries of the legs if the demand for more blood to meet the demand for physical exertion cannot be satisfied at once. We know, too well, the pain of senile gangrene; and pain is a constant feature in embolic blocking of an artery of a limb. I have notes of seven cases of this kind in which gangrene supervened, and in all pain was a serious and early symptom. In another type of case where gangrene of the leg resulted from thrombosis of a popliteal artery the pain was severe and clamant. The patient was walking home from work when he was suddenly seized with acute pain in the leg, so acute that he was able only with difficulty to reach his home a hundred yards away. When admitted into hospital a few hours later the pain was still severe.

It may seem difficult to correlate such occurrences with angina pectoris. Angina occurs in such diverse types of case. It is found in patients with and without heart disease, associated with a high and a low blood pressure, after operations and pregnancy, in patients with high and low blood counts. What common factor can obtain among these patients?

Keefer and Resnik analysed a series of 399 cases of angina, including 13 cases of their own, in whom post-mortem examinations had been made. In all but 19 cases the coronary arteries were diseased, and in the exceptions the aortic valves were incompetent. *Viewed from the physiological standpoint* an anoxæmia of the cardiac muscle can readily be assumed to occur under certain circumstances. Disease of a coronary artery will necessarily limit the flow of blood to the parts concerned, and the blood-supply, while sufficient for the muscle if working quietly, may be insufficient if the extra strain of physical exertion or some temporary elevation of the blood pressure is added. In aortic incompetence the diastolic pressure is low, and as the cardiac muscle is supplied with blood during diastole some ischæmia must necessarily obtain, even when the patient is at rest. In many cases, too, the aorta as well is diseased, and the orifices of the coronary arteries are narrowed and the ischæmia consequently exaggerated.

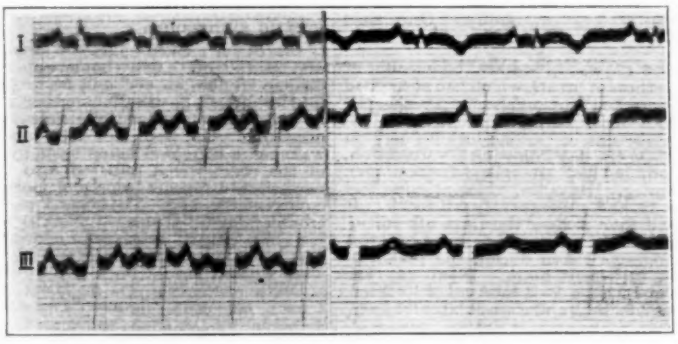
Angina is rare in mitral disease, for congestive failure rapidly ensues on exertion, and the dyspnœa checks exertion before the painful stage of anoxæmia occurs. It is rare in the severe anæmias, as all the tissues of the body are concerned and the general flabbiness prevents the possibility of undue strain upon the heart. But in disease of the coronary arteries *only a part of the heart* may be involved, the greater part of the muscle being unaffected. The heart can thus respond effectively to a demand for increased activity, but the part whose blood-supply is limited now becomes relatively ischæmic and so gives rise to painful sensations. The liability to angina can coexist with the possession of considerable power by the heart as a whole. Intermittent claudication and embolic blocking of the peripheral arteries are exactly comparable to angina and ischæmic necrosis of the heart. If the circulation is impaired symptoms will only ensue if exertion renders the parts relatively anæmic, while if the block is complete the symptoms will continue indefinitely.

Many patients who suffer from angina tell us that while they are capable of undertaking considerable exertion under favourable conditions attacks ensue if they are exposed to cold winds, if exercise is undertaken immediately after food, or if they are subjected to nervous strain. John Hunter's case at once returns to our memory. Prof. MacWilliam says:—

"So far as my observations go there is not necessarily such rise of blood pressure on exposure to cold as would throw a decidedly greater strain upon the heart. It seems to me that some transient attacks of pain, with no obvious and sufficient exciting cause, probably depend on a central nervous factor, an increased susceptibility to pain from irritant impulses arising in the heart. Exposure to cold, for instance, often tends to excite neuralgic pains, anywhere, in a susceptible person."

Such an explanation seems more than plausible. Many of these patients are highly strung and very intolerant of their discomforts. Several patients, too, have informed us that their attacks cease *instantaneously* as soon as they have swallowed a tablet of trinitrin, and before any effects of the drug could have been manifested. Vasomotor alterations in the distribution of the blood may also play a part. "If you eat till you're cold you will live till you're old," the vasomotor reply to the need for an increased blood-supply to the digestive organs after a meal, may perhaps lessen the supply of blood to the systemic arteries elsewhere.

FIG. 2.




20.ii.30. 1.iii.30.
Note the changes in QRST after the attack of 26.ii.30.

### VARIETIES OF ANGINAL ATTACK.

It has been my lot to witness a considerable number of attacks of angina. I can see still the anxious expression of a colleague during a seizure, his sweat-bedewed features, his absolute immobility, even his breathing being checked, and his inaudible declinature of a proffered hypodermic injection.

In a second case death occurred. The patient had been ill for some months with attacks of pain which were becoming more frequent and more severe. He drove into town with his doctor, and chatted happily during the drive. On arrival he hurried across the pavement and up the steps of the house, and pain at once supervened. When seen a few minutes later he was sitting restlessly upon a chair, complaining of acute substernal pain which shot down into both arms. He was flushed, excited, and talkative, and tried to make himself more comfortable by changes in position and attempts at retching. After the administration of some amyl nitrite and brandy, the pain abated in severity, but he was conscious that the attack had not ended. In a few minutes an exacerbation occurred, followed by a remission, and again by an exacerbation of the pain. He was coughing from time to time, and expectorating some mucous fluid which was slightly tinged with pink. The attack had now lasted for half an hour, and the pulse failed perceptibly for some moments, but steadied before any stimulant could be applied. His face, at first flushed, became ashen and bluish. The pain again recurred in great severity, the pulse failed, and he died 45 minutes after entering the house.

The pain varied in intensity but never completely remitted. It did not immobilise him and he moved restlessly and talked almost continuously. The pulse at first was a little frequent, full, and quick. During the acme of the pain its rate increased but probably never exceeded 120. It was always regular, the failure in volume and strength being the striking feature.

A third case may be quoted. The patient had had attacks of angina for a year before his admission into hospital, and on the day prior to his admission a severe attack which persisted for 36 hours. Subsequently, his attacks were minimal and of short duration. But on Feb. 26th a severe attack ensued about 9·20 A.M., and continued until the afternoon. When seen a few minutes after the onset he looked very collapsed, and complained of severe pain in the epigastrium extending up into the chest and down the left arm as far as the wrist. His pulse, which had been running in the 80's, was now over 100, and had lost notably in volume and strength. The cardiac sounds were distant and indistinct. In the afternoon the pain passed away and his pulse regained some of its former quality. For the next six weeks his symptoms remained more or less in abeyance until one evening, when some friends were visiting him, an attack supervened. He died almost instantaneously. (Fig. 2.)

In the first of these three cases the pain was intermittent and of short duration. In the second case it persisted and cardiac failure rapidly followed. In the third case, during the attack which was observed, the occurrence of pain was accompanied *at once* by grave cardiac failure, which continued for some weeks. In the first case the anoxæmia was relative and temporary; in the second relative at first, but continued; in the third absolute and continued. In this last case examination revealed a large infarct of the apical part of the heart, due to occlusion of the descending branch of the left coronary artery.

In another group the symptoms are those of congestive cardiac failure. The onset may be sudden or insidious.

A labourer, aged 63, while climbing up a gangway on to a ship suddenly became extremely short of breath and was unable to proceed. His fellow workmen pulled him on to the deck and he soon felt better and was able to go home, where he stayed for four days. As he then felt quite well he resumed his work, but he at once became short of breath and had to take to bed two days later. His feet became swollen, his breathlessness increased, and orthopnœa ensued. He was restless and slept badly. A few days later he began to experience pains in the front of his chest and all his discomforts became intensified. Three weeks after the initial seizure he coughed up a considerable amount of blood, and the hæmoptysis continued. When admitted into hospital a few days later he was collapsed, cyanosed, and cold. His pulse was regular, of moderate pressure, and quick. The heart was normal in size and site and the sounds, though distant and indistinct, were pure. Œdema was extensive, the liver was enlarged and tender, and the bases of the lungs were dull to percussion. He remained in much the same condition for five days, and then died suddenly.

On examination an infarction of the lower two thirds of the left ventricle was found, the wall being thinned and bulging. The left coronary artery was blocked about an inch below its origin. A subacute pericarditis explained the appearance of thoracic pain in the *second* week of his illness.

In the following case the onset of the symptoms was insidious.

The patient, a painter aged 51, was a healthy man who had had an attack of "influenza" at Christmas, for which he was confined to bed for three weeks. When he resumed his work he found that he was short of breath upon exertion, and felt his heart beating. Two months later he caught cold and bronchitis developed. His ankles became swollen and

the dyspnœa and palpitation worse. He was forced to take to bed in the beginning of March. When admitted into hospital on April 18th he was very short of breath and had to sit up in bed. The feet were œdematous, the liver enlarged, and dullness was present at the bases. The heart was enlarged in both directions, the cardiac sounds were short and of poor quality with a systolic murmur at the base. The pulse was regular, with a blood pressure of 150–110 mm. Hg. His progress was unsatisfactory. Some improvement occurred from time to time, but was invariably of short duration. Infarcts occurred in the lungs, and in August his blood pressure began to fall, touching 110–80 mm. in September. Pneumonia ensued in October, and he died in a couple of days.

Examination showed widespread atheroma of the coronary arteries, the descending branch of the left vessel being almost occluded two inches below its origin, while the right vessel was greatly narrowed in more than one place. A gross fibrosis of the apical third of the left ventricle was present, apparently a dystrophic fibrosis and not the result of infarct.

In another group the symptoms are those of disturbance of the cardiac rhythm. Of these the most common is heart-block, which is sometimes accompanied by the Adams-Stokes syndrome. One case may be mentioned.

The patient, a man aged 47, was in hospital on account of pains in his chest and shortness of breath which had succeeded a "cold." He had well-marked aortic valvular disease, the result of rheumatic endocarditis many years before, and he had been in hospital on account of cardiac insufficiency on two previous occasions. On the day following his admission, at 3·40 in the afternoon, he had an epileptiform attack which lasted for five minutes. His pulse, which at noon had numbered 112, was now 32, and subsequently fell to 22. It remained infrequent until four o'clock the next afternoon, when it was found to number 84. His subsequent progress was good. Electrocardiograms taken during the period of infrequent pulse showed full heart-block. Next day the rhythm was of sinus origin, with a P–R interval of 0·32 sec. A week later it measured 0·20 sec., and a week later 0·14 sec.

In yet another group the symptoms are those of disease in organs other than the heart, due to similar arterial causes, no special suggestions of cardiac difficulty being present, and the diagnosis being made on the post-mortem table. Cerebral symptoms are most common, and were due in this series to embolism, thrombosis, and rupture of a cerebral aneurysm. Several of our clinical series have had strokes before or after cardiac seizures. One of our patients died from chronic uræmia, the sequel of cirrhotic kidneys.

The last but by no means the smallest group is of little clinical interest, the cases of "sudden death" whose cause is only ascertained after death. It seems to contain almost every case of gumma of the heart (Herringham) as well as many cases of ischæmic necrosis and rupture of the heart.

## The Diagnosis.

The recognition of myocardial fibrosis depends partly upon the story of the illness and partly upon the physical signs. If we are correct in our conception of the causes of angina its occurrence, apart from aortic valvular disease, pregnancy, operations, or severe anæmia, indicates interference with the coronary blood-supply, and hence a potential or an actual fibrosis. Infarct, heart-block, and bundle branch block are, too, indications of fibrosis.

The diagnosis of angina is founded on the story of the patient. The occurrence of pain in the chest on exertion, however slight, is the criterion. The early symptoms are often trivial, their significance is missed, and the diagnosis is made too late for effective treatment to be possible. There is no difference of kind save in degree between angina and infarct, though the clinical syndrome differs. At the present time it is unnecessary to refer in detail to the differential diagnosis, which is well shown in the following table, based upon the tables of Keefer and Resnik and of Bedford and Parkinson.

| | ANGINA. | ISCHÆMIC NECROSIS. |
|---|---|---|
| Anoxæmia | Relative and transient | Absolute and permanent. |
| Pain | Of short duration | If present prolonged. |
| | Occurs on exertion and so diurnal | Occurs without obvious cause and often nocturnal. |
| Epigastric pain | Rare | Not uncommon. |
| Amyl nitrite | Often relieves | Has no effect. |
| Rest | Relieves | Has little or no effect. |
| Attitude | Immobile | Restless. |
| Cardiac failure | Rare | Often, indeed usually, present. |
| Dyspnœa | Rare | Often present. |
| Pulse— | | |
| Rate and rhythm | Often unchanged | Often altered. |
| Blood pressure | May be high | Usually falls. |
| Electrocardiogram | Often abnormal | Usually abnormal. |

One symptom which is not uncommon in infarct demands more attention. The pain is not infrequently referred to the abdomen and associated with gastric symptoms.

One of our patients played a game of golf in the afternoon, and then set off to drive home, apparently in his usual health. Engine trouble ensued and he was delayed, and, as he was late for dinner, he drank some beer. On his arrival home late at night he complained of sickness and vomited on several occasions. He went to sleep about midnight, but was wakened a couple of hours later by severe pain in the front of the chest which radiated into the left arm. The pain necessitated repeated doses of morphia, but lessened in the course of the day. The nausea persisted and he was much troubled with flatulence. For 36 hours after the onset of his symptoms no evidence of cardiac disorder was apparent. The heart was normal in size and site, the cardiac sounds were within normal limits, the pulse was regular, beating at 84 per minute, with a blood pressure of 138–84 mm. (about his usual figure). Pericardial friction was then detected by Dr. A. S. Henderson, who found a pulse-rate of 108 and a blood pressure of 114–80 mm. The gastric symptoms persisted for the next week.

Another patient, who for some months had had several attacks of dyspnœa on exertion, was suddenly, while brushing boots, seized with acute pain about the right breast which passed back into the scapular region, accompanied by retching and vomiting. The sickness and pain persisted all day, notwithstanding the administration of morphia. He had a restless night, and next day was still sick while the pain was less acute. Next morning, 48 hours after the onset, Dr. J. L. Anderson detected pericardial friction. The heart previously had seemed to be normal. The pain was now absent save on movement, but the nausea and flatulence persisted.

Another patient who had suffered for some years from symptoms of cardiac distress complained one day of pains in the abdomen which did not, however, confine her to bed. On the fourth day she was unable to rise and returned at once to hospital. Her complaints were purely abdominal. She had a coated tongue and much flatulence. Her cardiac condition seemed unchanged. She rapidly improved, but three days later became restless and heady, and required a sedative at night. Next morning she was very well and sat up and joked with her neighbours, but at 11 o'clock was seen to become cyanosed quite suddenly and died in five minutes from rupture of the heart through an infarct of the left ventricle.

Another patient had a laparotomy performed for similar symptoms, and recovered from his treatment for the time. He died six months later with cardiac symptoms. An infarct was found about the apex of the left ventricle and the septum.

It is useful to remember that the blood pressure in adults is rarely beneath 120 mm. in the absence of some cardiac disorder.

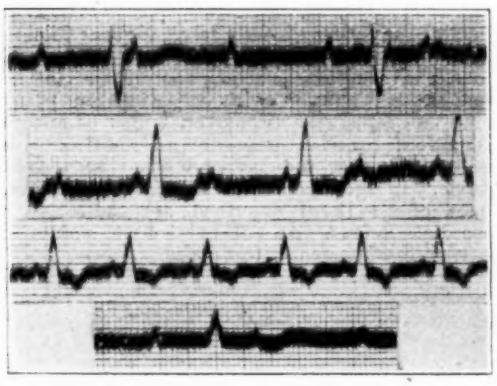
In a certain number of cases definite evidence of myocardial disease is shown by the electrocardiogram, but too much must not be expected from this form of investigation. The electrocardiogram is the record of the changes in potential produced by the orderly mass contraction of the two hearts. If the orderly sequence of events is interrupted by myocardial lesions hitting the bundle branches and interfering with their function abnormal deflexions will occur

in QRS. But lesions elsewhere do not necessarily deform the picture. Deformities will only occur if the mass of tissue thrown out of action is considerable in size and localised. Small focal lesions, whether scanty or numerous, are unlikely to deform the curve, especially if they are more or less uniformly distributed throughout the heart. It must, too, be remembered that a deformed electrocardiogram may return to normal after an infarct, if the process of healing removes the want of balance between the different parts of the heart, or its irritating influence ceases. The records are thus merely the records of damage to the muscle, and in no way an index of the cause of the damage. They may, too, be altered by associated disease of the cardiac valves, or high blood pressure in the systemic or pulmonary circuits.

In cases of angina careful examination of the heart usually reveals some definite abnormality, an increase of the size of the heart, a high or low blood pressure, abnormal cardiac sounds or electrocardiograms. But occasionally the heart seems to be quite normal.

This was the case in a patient aged 63, who had had anginous symptoms for several years. The heart was perhaps a trifle large, but the sounds were pure and of average quality, and an electrocardiogram showed normal

FIG. 3.



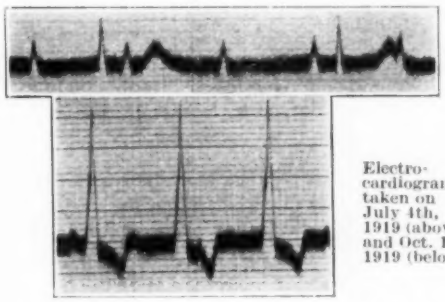
Lead I. The dates of the electrocardiograms, from above downwards, are March 26th, 1926; Sept. 6th, 1927; Feb. 28th, 1929; and Jan. 6th, 1930.

deflexions. His blood pressure was 150–105 mm. A month later he died suddenly after walking home, uphill, against a strong wind. A post-mortem examination of a man, aged 47, who died shortly after admission to hospital, affords an explanation of these cases. He had suffered for a couple of months from anginous attacks. There was a well-marked syphilitic aortitis which had caused a marked stenosis of the orifices of the coronary arteries, the vessels in their course and the myocardium being apparently perfectly healthy. An electrocardiogram would, presumably, have been quite normal.

In the large majority of patients with myocardial lesions, however, some abnormality is apparent on examination. The apex impulse may move outwards. In one of our patients who had an acute endocarditis, with myocarditis, the apex was situated 13·5 cm. from midsternum in May, 14 cm. in September, 15·5 cm. in February, and 16·5 cm. in May, just before his death. The apex impulse may disappear at first only when the patient is lying on his back, reappearing when he lies on his side; but later on whatever his position. The cardiac sounds may alter, losing loudness and becoming shorter, and the first sound may become impure from incompetence of the mitral or tricuspid valve. Or the relative intensity of the aortic or pulmonary sounds may alter from a failure of one or other ventricle. The electrocardiogram may show progressive alterations.

In the majority of patients who have heart-block the block persists for the rest of their life, but this is not always so. We have already mentioned a case

FIG. 4.



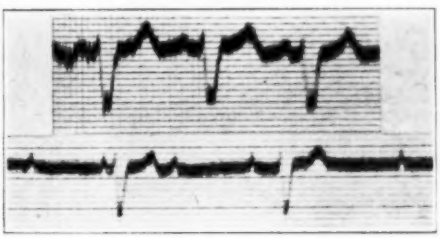
Electrocardiograms taken on July 4th, 1919 (above), and Oct. 10th, 1919 (below).

in which full heart-block only lasted for 24 hours. In another patient heart-block was present on August 3rd and had disappeared on the 10th. In the following case a full heart-block passed away to recur about two years later.

The patient is now aged 66, and works all morning in his office. He had always been a healthy man, save for an attack of dysentery on the Peninsula in 1915. In 1919 he had an attack of shortness of breath at a picnic, and again in 1923 when rolling the lawn, having to lie down on both occasions for some minutes before he recovered. In 1924 he had an attack of pain in his chest when riding. During the winter of 1924–25 he complained of shortness of breath upon exertion, but continued at his work. On May 7th, 1925, he went to a cinema, and when returning home nearly died from cardiac failure while climbing up the stair of a tram-car. When seen shortly afterwards he was very collapsed, with a regular feeble pulse of 44. He made a slow recovery. In the summer of 1928 he had an attack of dysentery which kept him in bed for a few days. In September, 1929, he had an attack of influenza, and two months later fainted when in his office. Otherwise he has been in comfort, working in his office and taking little exercise.

The changes of rhythm have been striking. A polygraph tracing on May 11th, 1925, showed full heart-block, and an electrocardiogram on March 26th, 1926, showed a similar rhythm. On Sept. 6th, 1927, a 2–1 block was present. On Feb. 28th, 1929, the rhythm was normal save for some

FIG. 5.



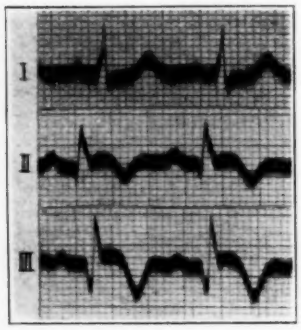
Bundle branch block on Nov. 24th, 1928 (above) and full heart-block as well on Dec. 14th, 1928 (below).

auricular extrasystoles, but on Jan. 6th, 1930, full heart-block was again present, having apparently recurred at the time of the syncope in November, 1929, as the pulse which in September had been running at 80 was then found to number 40 (Fig. 3). The variations in his blood pressure are very interesting. In 1926, when the block was full, it measured 215–70 mm.; in 1927, with the 2–1 block, 175–70 mm.; in 1929, with a normal rhythm, 160–110 mm.; and in 1930, after the return of the full block, 240–94.

Bundle branch block, too, may occur under similar conditions. An old man who was in the wards suffering from full heart-block with Adams-Stokes symptoms showed a full heart-block in July. During the autumn he was evidently slowly failing, and in October a routine examination showed right bundle branch block as well (Fig. 4). (You must use the wet fly if you wish to catch bundle branch block!) The opposite sequence was detected in an old lady who was suffering from recurrent syncopal attacks, due to coronary disease. The electrocardiogram of Nov. 24th showed left bundle branch block, while that of Dec. 14th showed as well full heart-block (Fig. 5).

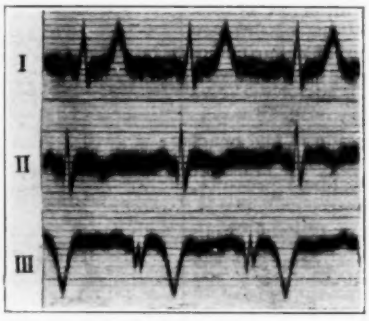
But the most common changes are in the ventricular complex.

FIG. 6.



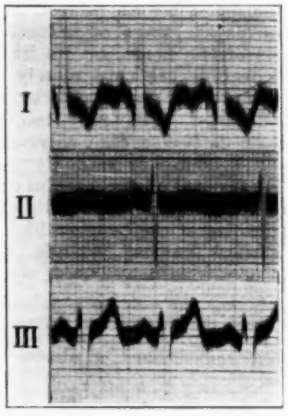

Electrocardiograms taken ten days after an infarct, showing deviation of R–T in leads II. and III.

FIG. 7.




Inversion of T in lead III.

FIG. 8.




Inversion of T in lead I.

ELECTROCARDIOGRAM IN MYOCARDIAL INFARCT.

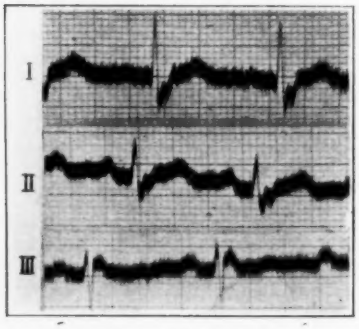
The changes in the electrocardiogram have been studied most fully in cases of myocardial infarct, but serial records, with post-mortem examinations, are still too few for accurate deductions to be possible. The following account is based upon the recent paper by Rae Gilchrist and Ritchie.

The early changes in infarct are usually shown as a deviation of the R–T segment from the iso-electric level. The deviation may be upwards or downwards, the direction in leads I. and III. being opposed. In the course of a few days or weeks the curve alters, negative T waves, which may be of exaggerated size, appearing, running out of QRS without any iso-electric period. The subsequent changes are in the direction of normal, which may be attained, or a negative T may persist indefinitely. But, as Gilchrist and Ritchie point out, R–T deviation may occur in various toxic conditions, such as digitalis and antiarin poisoning, in perfusion with variations in pH, in uræmia, and asphyxia. Moreover, T may be affected by emotion, exercise, exposure to heat or cold, digitalis poisoning, and preponderance of the left ventricle. In the absence of these factors, however, changes of the kind described are indicative of myocardial lesions. An abrupt onset points to infarct, an insidious onset to fibrosis.

These changes, too, are not invariably present in cases of myocardial infarct; R–T deviation was not present in 41 of 93 cases of their series, and T was not inverted in eight of 25 cases of coronary sclerosis confirmed by post-mortem examination.

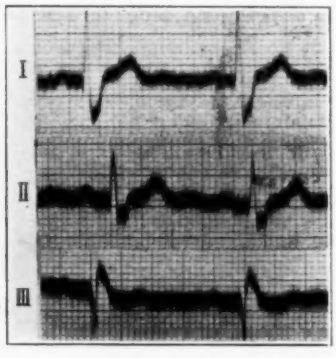
Personal experience coincides with Gilchrist and Ritchie's conclusions, for in 12 cases of gross myocardial damage, examined post mortem, the electrocardiogram failed in 4 to reveal characteristic changes. Changes are, however, often striking. Fig. 6 shows R–T deviation in leads I. and III. two

FIG. 9.



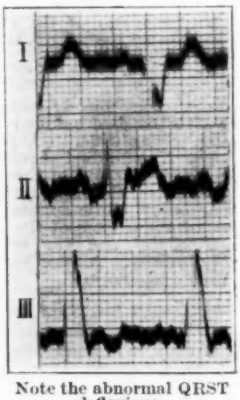

Note the abnormal QRST deflexions.

FIG. 10.




Note the abnormal QRST deflexions.

FIG. 11.




Note the abnormal QRST deflexions.

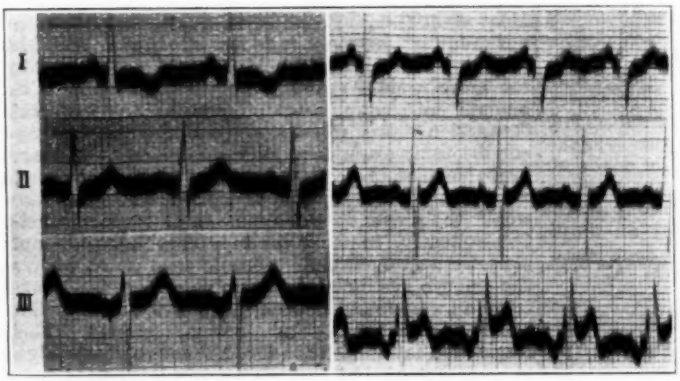
months after an attack of acute dyspnœa, during which the pulse for a time failed completely. Fig. 7 shows notable inversion of T five weeks after an attack of acute thoracic pain accompanied by great cardiac weakness, which had ensued on exertion. Fig. 8 shows well-marked inversion of T, in the opposite direction, three months after an attack of acute thoracic pain and breathlessness which had awakened the patient from his sleep. Fig. 9 shows other changes, associated with broadening of QRS, obtained five months after the onset of "tightness" of the chest upon exertion, followed a couple of months later by a full attack of angina. Fig. 10 was obtained from a man who three weeks previously, on a hot summer day, had suddenly become very giddy. The giddiness persisted. Fig. 11 was obtained from a woman who had had an attack of shingles and was found to have a mitral systolic murmur.

Fig. 12 shows a not uncommon alteration of lead III.

The patient first came under observation in 1925, when he complained of shortness of breath upon exertion which had succeeded a catarrh contracted some four months before. It seemed possible that he was suffering from whooping-cough, with which his children were at that time affected. The heart seemed normal on examination. In the summer he improved, and resumed his golf. In January, 1927, he again caught cold, and his breathlessness returned. He was confined to bed for a week, and on his return to business found that he was very short of breath upon even trivial exertion. The electrocardiogram now showed definite R-T deviation, most distinct in lead III. Otherwise the heart seemed quite normal. He refused to take care, and went a golfing holiday which confined him to bed for ten days. Return to business again produced an exacerbation of his discomforts, and he had to return to his bed. One evening he complained of some discomfort or pain in the epigastrium, which persisted next morning. But he sat up in bed dictating letters, and suddenly fell back dead.

We have watched somewhat similar electro-

FIG. 12.



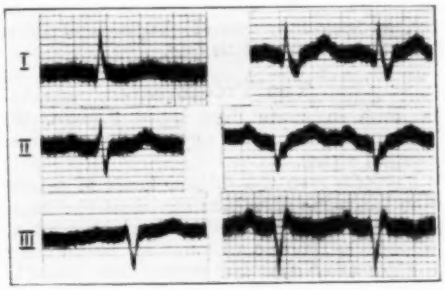

17.iv.25. 8.ii.27.
Changes in the electrocardiogram.

cardiograms developing insidiously during a period of two years before the death of the patient. Fig. 13 shows a change in the electrocardiogram of a case of angina, where health is apparently stationary.

## The Prognosis.

The prognosis in myocardial disease is extremely difficult. The majority of patients die shortly after the first onset of definite symptoms of cardiac distress, some, indeed, coincidently with the first occurrence of the lesion (infarct). But some recover their health and activity in greater or less degree. One patient died at the age of 70, in full heart-block of syphilitic origin, which W. D. Macfarlane states occurred 30 years before his death. Another, as already narrated, is still at work five years after the occurrence of his first full block. Another patient who had had a partial block of insidious onset worked for nearly

FIG. 13.




2.vii.29. 12.v.30.
Changes in the electrocardiogram.

five years subsequently until his death from apoplexy. Similar records are available in cases of bundle branch block. One of our patients whose block had had a sudden onset died three years later from apoplexy, the intervening years being free from cardiac discomforts. Another, whose block had ensued simultaneously with aortic valvular disease during an attack of acute rheumatism, lived for seven years, while another patient, an alcoholic, who presented Cheyne-Stokes breathing at the time of observation with albuminuria, a high blood pressure, chronic bronchitis, and an ankylosed hip, lived for more than seven years subsequently.

The results in infarct, too, are sometimes very satisfactory. One of our patients lived for more than seven years, working hard for more than five of these years. Two others remained at work for about five years, another for four, and another still plays golf five years after his myocardial "insult" was recognised. Four at least of the cases of insidious onset lived for more than four years after its recognition, and one is still at regular work.

The lesions which are due to myocarditis, whether temporary or permanent, are perhaps the most satisfactory, though they vary as the cause is rheumatic or "bacterial," and with the probability or the reverse of a recurrence of the active process. The outlook in syphilitic cases is always hopeful as in visceral syphilis elsewhere, if appropriate treatment is possible, but too much must not be expected. The causal lesion is usually an endarteritis but occlusion of the vessel is generally due to thrombosis, which, as Gowers pointed out many years ago, is not a specific lesion, and so not amenable to specific treatment. Necrotic tissue cannot be revived. But specific treatment can open out the lumen of affected arteries in the neighbourhood, and so improve the nutrition and augment the functional activity of the parts at the periphery of the primary lesion. Atheromatous lesions cannot be dissipated, though the progress of

the sclerosis can be delayed. But it has been clearly shown by many observers, and recently by Campbell with injected hearts, that, given time, extremely efficient anastomotic developments are possible, particularly if the process of the narrowing is slow, a conclusion which has been corroborated by many clinical observers. The danger of sudden death, however, remains.

Serial electrocardiograms are of service in this respect, as they may reveal progressive changes or a continuance of the status quo.

## The Treatment.

The issue in acute myocardial disease, whether inflammatory or ischæmic, depends upon *the treatment of the initial attack*.

We have all seen the dilated heart of acute rheumatic endocarditis shrink in size with the subsidence of the fever and the arthritis, but the scars on the valves and the muscle will not be sound for many weeks after the acute symptoms have passed. We cannot predicate how long it will take for resolution to be complete, for we know that in pneumonia, for example, the rate of resolution of the lung varies greatly from causes of which we are seldom cognisant. The only safe plan is to play for safety and maintain rest for several months after the acute symptoms have passed. We keep these rheumatic patients in bed for at least two months after the pulse-rate and the temperature have returned to normal, and even for a longer period if the patient's general health does not seem to be restored.

A similar line of treatment affords the best results in infarct. The rest *must* be absolute at first. We have known several patients die on the night stool, and more have serious syncopes. Restlessness must be combated by sedatives, and by opium if necessary. Rest in this case, also, must be continued for many weeks.

The chronic cases of insidious origin are more difficult to treat, but here, again, we have had satisfactory results from an initial rest in bed for several weeks, thus permitting anastomotic developments to proceed before throwing any undue strain upon the affected muscle. Massage of a mild kind is often useful at this stage. When exercise is again permitted care should be taken that it is never of such a kind as produces *any* discomfort, the patient being warned not to fight his troubles, but to learn how to circumvent them. The need for an amyl capsule should be prevented by the common-sense accommodation of the patient's desires to his limitations.

A syphilitic origin indicates specific treatment; while every effort should be made to improve the general nutrition and to maintain the value of the blood, particularly if the channels of the blood stream are narrowed. Symptoms of cardiac failure require treatment of the usual kind.

We have great pleasure in acknowledging the kindly assistance of many friends; in particular, J. L. Anderson, G. B. Fleming, A. S. Henderson, J. A. MacWilliam, W. D. Macfarlane, J. Muir, W. T. Ritchie, W. Roxburgh, J. F. Somerville, A. Tindal, and Farquhar Macrae.

# A NOTE ON
# THE METABOLISM OF TUMOURS.

BY F. DICKENS, M.A. CAMB., PH.D. LOND.,
WHOLE-TIME WORKER FOR THE MEDICAL RESEARCH COUNCIL;
AND
F. ŠIMER, M.D.,
CLINICAL ASSISTANT, UNIVERSITY OF BRATISLAVA, CZECHO-SLOVAKIA,
*(From the Courtauld Institute of Biochemistry, the Middlesex Hospital.)*

FOR many years a search has been made to find some differences between the chemical changes occurring in normal and malignant tissues which might throw some light on the problem of tumours. Are there any chemical reactions characteristic of tumour tissue which may distinguish it from normal body tissues? Of the many attempts which have been made from time to time to answer this question, at present there appears to be only one striking series of discoveries which may be regarded as firmly established. These have resulted from the work of Otto Warburg and his collaborators.[1]

This group of workers has devised specially sensitive methods for studying the metabolism of isolated tissues in vitro, as a result of which they were able to show that the metabolism of the tumour cell is made up of two distinct phases: (1) respiration; (2) glycolysis—i.e., the breakdown of sugar into lactic acid *without* consumption of oxygen.

Very soon after the discovery by Otto Warburg of glycolysis by tumour tissue, it became clear that the property of glycolysis is widely distributed among animal tissues. In the absence of oxygen all animal cells produce lactic acid from carbohydrate, though different types of tissue produce different amounts. Most adult tissues glycolyse to a very limited extent, but rapidly growing cells of all kinds, including tumours, have a high glycolysis, and broadly speaking the more rapidly growing the tissue the greater the amount of lactic acid produced. An important distinction arises when the glycolysis under aerobic conditions is examined. For some time it appeared probable that the characteristic of malignant growth was that the respiration of tumour tissue was too small to prevent the appearance of lactic acid. Consequently, tumours produce very large amounts of lactic acid even under aerobic conditions, whereas the embryo has little or no aerobic glycolysis. Benign tumours were found to occupy a position intermediate between malignant and normal growth. Their respiration is sufficient to lower the aerobic glycolysis to some extent, but there is a fairly large production of lactic acid aerobically.

Later work made it clear that this classification was untenable. Many important cases of malignant tumours with a high respiration have been recently described. The effect of this high respiration on glycolysis is very variable. In some examples —e.g., some of the spontaneous mouse tumours studied by Murphy and Hawkins[2]—it caused the complete disappearance of aerobic glycolysis. In

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other instances in spite of the large respiration the greater part of the glycolysis persists aerobically. A number of interesting articles of this have been carefully studied by Crabtree [3] and confirmed by Warburg.[4]

In order to reconcile these diverse facts it is necessary to make certain assumptions which do not appear at present to be quite satisfactory. In particular, it is necessary to postulate that in some tumours, however large the respiration may be, it has lost the power normally present in all tissues of removing a definite amount of lactic acid. During an investigation by us of tissue metabolism, the detailed account of which is in the course of publication, some important new facts appeared which are intimately connected with the general aspects of this problem. Those points of our investigation which have a direct bearing on the problem of tumour metabolism are briefly recounted below.

## Oxidative Metabolism of the Tissues.

Whilst glycolysis is concerned solely with carbohydrate the same cannot be said of the oxidative metabolism, which is in many cases divided between carbohydrate, fat, and protein. The questions which we set out to decide were (*a*) what is the proportion of carbohydrate used in oxidation by various normal and tumour tissues? and (*b*) does the proportion of carbohydrate used in oxidation bear any relationship to the known power of the tissue to form lactic acid from carbohydrate?

It has not previously been possible to give any decisive answer to these questions, because for technical reasons suitable methods for the sufficiently accurate measurement of respiratory quotient in highly glycolysing tissues were lacking. A method has now been arrived at which has enabled us to determine the respiratory quotient (R.Q.) in normal and glycolysing tissues with a maximum error of 0·02. By the application of this technique the above questions can be answered with considerable exactness.

*Normal Tissues.*—In a series of normal tissues examined by this method the value of R.Q. showed a definite and consistent relationship to the value of anaerobic glycolysis determined under similar experimental conditions. This is at once evident from the figures given for normal tissues below. In this Table the value of the R.Q. is compared with the measurements of lactic acid formed per hour anaerobically, the latter being expressed as a percentage of the dry weight of the tissue. All the values in this Table represent the mean of a number of determinations, all of which were consistent. Hence in normal tissues the increase in the ability to oxidise carbohydrate, as shown by the increasing value of the R.Q., runs parallel to the extent of anaerobic breakdown of sugar to lactic acid by the various tissues.

| T. | R.Q. | A.L.A. | T. | R.Q. | A.L.A. |
|---|---|---|---|---|---|
| Liver | 0·78 | 1·2 | *Crocker sarcoma (mouse)** | *0·88* | *8·7* |
| Kidney | 0·86 | 1·2 | *Spindle-cell mouse tumour** | *0·91* | *9·0* |
| Intestinal mucosa | 0·85 | 1·6 | *Tar carcinoma (mouse)** | *0·87* | *9·5* |
| Submaxillary | 0·87 | 2·7 | *Mouse sarcoma 37S** | *0·86* | *10·6* |
| Spleen | 0·89 | 3·2 | *Rous chicken sarcoma* | *0·92* | *12* |
| Testis | 0·94 | 3·2 | Chorion | 1·02 | 13 |
| Embryo | 1·04 | 3·5 | *Jensen sarcoma* | *0·83* | *14* |
| *Spontaneous mouse tumour I.* | *0·87* | *6·4* | Retina | 1·00 | 35 |
| *Slow growing sarcoma* | *0·94* | *7·0* | | | |
| Chicken embryo | 1·00 | 7·3 | | | |
| Brain cortex | 1·00 | 7·6 | | | |
| *Spontaneous mouse tumour II.* | *0·91* | *8·2* | | | |

T. = Tissue (rat tissues unless otherwise stated). R.Q. = Respiratory quotient. A.L.A. = Anaerobic lactic acid per cent. of tissue weight per hour.

* We wish to express our thanks to Dr. J. A. Murray, F.R.S., Imperial Cancer Research Fund, for these tumours.

*Tumour Tissue.*—If the figures given in italics in the Table are now considered, it will be observed that the values for the R.Q. of tumour tissue are always definitely below unity in the fairly representative collection measured up to date. All the tumours formed very large amounts of lactic acid anaerobically.

It therefore follows that in spite of the high *anaerobic* catabolism of carbohydrate, the ability to oxidise this foodstuff is definitely defective in tumours.

*Human Tumours* —The majority of human tumours, unlike the tissues reproduced in Table I., contain variable proportions of tumour cells mixed with normal tissue and rarely approach the high content of tumour cells found in transplanted tumours. Consequently, the lactic acid produced per unit weight of tissue is less than for the tumour tissues in Table I. The figures are therefore not included in the above Table, but two examples are given below, from which it will be seen that the same abnormally low respiration of carbohydrate occurs.

| Human Tumours. | R.Q. |
|---|---|
| Carcinoma of breast | 0·84 |
| Papillocarcinoma of bladder | 0·87 |

*Discussion of the Above Table.*—Considering first the normal tissues, our results do not support the apparently somewhat prevalent view that most normal tissues when given a sufficient supply of sugar utilise mainly carbohydrate. On the contrary, a number of normal tissues have, under these conditions, a mixed oxidative metabolism. These are the tissues with low anaerobic glycolysis. On the other hand, all highly glycolysing normal tissues have a carbohydrate respiratory quotient. This group includes retina, which has proved a serious exception to all previous attempts to classify animal tissues on the basis of their metabolism.

The correctness of Bohr's hitherto unconfirmed observation, made in 1900, that the embryo has a quotient of unity is proved by the above experiments. In general, therefore, young growing normal tissues are distinguished from most adult tissues by (*a*) their high anaerobic glycolysis, and (*b*) their high respiratory quotient. In other words, normal growing tissues have a high carbohydrate metabolism, not only in the absence of oxygen but also aerobically.

Turning to the metabolism of tumours, it will be seen from the above classification that their position is definitely abnormal. Their rate of growth and their glycolysis resemble that of the embryo, whilst their respiratory quotient is that of the adult tissues.

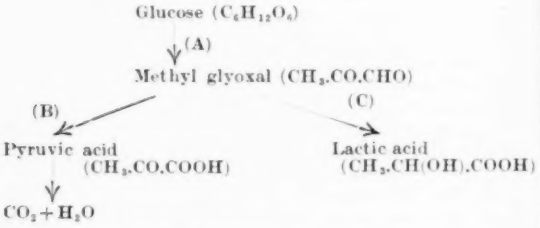
This investigation is now being extended to other representative types of pathological growth. This is obviously necessary before it can be stated how far this defective oxidation is limited to malignant tumours. We have, however, obtained some indication that similar metabolic damage may be associated with certain other types of pathological growth.

## Nature of the Defective Oxidation.

These facts show that in tumours the oxidation of carbohydrate is damaged in some way, whilst their anaerobic metabolism is unaffected. The question

arises as to what is this defect in the oxidation in tumours. In view of the fact that the insulin content of tumours has been shown to be low in comparison with that of most normal tissues,[5] one might expect that this fact might give a clue to a possible solution of the problem. However, the part taken by insulin, if any, is in this case not a simple one, since the addition of insulin to isolated tumour tissue does not affect its oxidative metabolism to a measurable extent.

It is impossible to carry the analysis of the oxidative defect in tumours further without considering the intermediary metabolism involved in glycolysis and respiration. The question is a difficult one, but probably the reactions shown in the following simplified scheme are of importance.




According to this scheme, from which many stages not essential for the present discussion have been omitted, the molecule of hexose is first split into two molecules of triose—very probably methyl glyoxal or its hydrate. In the absence of oxygen this three-carbon chain is not broken down further, but appears as lactic acid. In oxygen, a part of the triose is oxidised via pyruvic acid, finally to $CO_2$ and water.

Two types of carbohydrate metabolism may now be distinguished on the basis of our measurements.

*Type 1.*—The velocity of the changes in stage A controls the carbohydrate metabolism—aerobic and anaerobic. This is the case of normal tissue with low glycolysis and consequently low R.Q.

*Type 2.*—The velocity of the changes occurring in stage B is diminished. In this case a high glycolysis indicates the unaffected course along routes A and C, whilst a low value of R.Q. indicates damage to the reactions occurring by route B. This is the case in tumour tissue.

Support for this theory is given by three further important facts which the method used enabled us to establish with certainty. (1) Addition of lactate to the medium causes an increase in the respiratory quotient of tissues of type 1 (e.g., liver). Hence tissues belonging to this group can utilise metabolites having a three-carbon chain. (2) Addition of lactate to tumour tissues causes no change in the R.Q. (3) Addition of pyruvate to either normal or tumour tissue causes an increase of the R.Q. to over unity (theoretical R.Q. for pyruvic acid = 1·20). Hence both types of tissue can attack pyruvate, and in the case of tumours the break in the oxidative route B must occur between the methyl glyoxal and pyruvic acid.

*Summary.*—There is a definite deficiency in the oxidation of carbohydrate by tumour tissue.

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# REMOVAL OF NON-MALIGNANT TUMOURS OF THE BREAST.

By H. H. Greenwood, M.B., B.S.Lond., F.R.C.S. Eng.,

CONSULTING SURGEON TO THE GREAT WESTERN RAILWAY HOSPITAL, SWINDON.

The operation devised by T. Gaillard Thomas (sometimes called "plastic resection of the breast") for the removal of so-called "innocent" tumours of the breast deserves to be more universally employed.

Breast tumours displaying the stigmata of malignancy receive an appropriate radical extirpation, and to the technique of the operation anxious care is lavishly given. Those of known innocence, such as true adenomata or lipomata, are often removed without any consideration being bestowed on the psychological and æsthetic aftermath, which is left as a perpetual legacy to the patient. Even those, such as a cystic "mastitis," in which there is merely suspicion without real evidence of malignancy, may well be conceded a little more indulgence in the planning of the operation. Binnie[1] declares that in these cases the patient should "receive the benefit of the doubt and radical measures adopted"—that is, should be condemned to the radical operation forthwith. This counsel seems harsh and precipitate, ignoring the extremely severe character of the modern radical operation. A tumour which displays no evidence of malignancy on careful examination before the operation seldom shows sufficiently marked evidence, tactile or visual, during the course of the operation to warrant an immediate radical operation. The early or precancerous stage is detected only after careful microscopic examination by the pathologist, not by a hasty and cursory inspection during the course of the operation. The issues are too serious, the implications of the decision too far-reaching, for such cavalier methods. A cancer at so early a stage as to defy a careful physical examination beforehand will gain little further deadliness by the postponement of the radical operation for the few days necessary to establish a sure diagnosis by pathological examination.

In recent years fewer examples seem to occur of the enormous cysto-adenoma, neglected and allowed to progress until the whole of the mammary gland with its fatty envelope is hopelessly destroyed. A gross example would conceivably preclude any attempt to preserve even a ghostly image of the normal organ, and would compel an "amputation." So, too, those rare conditions of a progressive and destructive nature, such as tuberculosis, actinomycosis, and possibly gumma, demand effective extirpation of the whole organ, together with the overlying skin. Cosmetic considerations must yield to the necessities of the case, and usually a free removal by a lenticular incision is imperative. There remains a large class, including the simple adenoma, the so-called "interstitial mastitis," and intracanalicular fibro-adenoma, in the removal of which other considerations than the mere curing of the disease may well receive closer attention.

The adenoma, being an encapsuled tumour, can be effectively removed by a crescentic incision on the lower and outer margin of the breast, the whole organ being turned over and the tumour shelled out, after which the breast is replaced in its normal position and the wound sutured. An excellent description of this operation is given by Bickham,[2] the

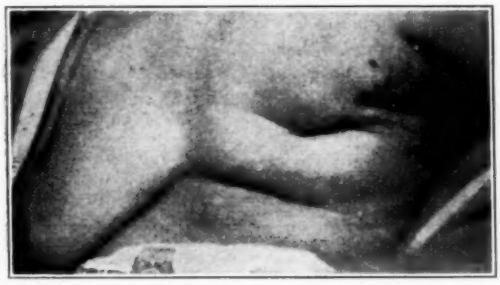
description following the account of the original operation devised by Gaillard Thomas and afterwards practised by J. C. Warren.

## Chronic Mastitis.

Most of the cases calling for limited removal of the mamma are cases of "interstitial mastitis" or, more correctly, "desquamative epithelial hyperplasia" (Cheatle).

Unfortunately the convenient term "chronic mastitis," admirably terse and descriptive, is inaccurate. The

FIG. 1.



The result of an operation done several years ago for a simple tumour of the left breast in a young married woman; I was consulted as to the possibility of effecting some mitigation of the distressing deformity inflicted. For such cases Gillies [22] has devised an ingenious plastic operation.

deductions of Lenthal Cheatle from his searching investigations into the pathology of the disease have received general acceptance, but the nomenclature that he suggests [3] has proved too cumbersome to pass into current literature. In his Hunterian lecture Geoffrey Keynes [4] reviewed the evidence and showed that chronic mastitis, fibro-adenoma, simple cyst, and galactocele have in common these histological changes: "round-celled infiltration (lymphocytes), fibrosis, dilatation, epithelial changes of two kinds (desquamative and proliferative), and formation of papillomata." He gives good reasons for believing that these so-called diseases are merely manifestations of the same underlying pathological processes. It seems impossible to devise a nomenclature that will be accurate and fully descriptive, and it would simplify our conception of these diseases if they were grouped together under one title. "Hyperplastic disease of the mamma" would have the merit of being, so far as it goes, more accurate than mastitis. There is, indeed, much to commend the plan of labelling a disease of which the pathology is obscure or the manifestations protean by the name of one who has advanced our knowledge of it. There is possibly as much warranty for the title "Cheatle's Disease" as for that of Köhler, Banti, Legg, or Schlätter. It is curious that the term mazoplasia, suggested to Cheatle by Rolleston in 1924, has not passed into current use.

Whilst awaiting a solution of this debatable but comparatively minor problem, we can realise that there are certain features about this group of interesting diseases, alike at least in their innocence and in their inability to transgress the limits of the corpus mammæ, which have a bearing upon the operation designed to effect a cure.

In so far as operative treatment of a tumour of the breast is concerned, the growth is either malignant or innocent. If it be innocent, complete removal without fear of recurrence can be achieved with certainty and ease, and there only remains for decision the method that confers on the patient the least degree of mutilation.

The vicissitudes of belief regarding the pathology of the disease mazoplasia is evidenced by the rich but chaotic terminology quoted by Parker Syms.[5] Of the 11 variants which he gives, that of Sir Astley Cooper, "chronic mammary tumour," is the most satisfactory, being descriptive and non-committal. Acute divergence of opinion as to the presence of inflammation has existed; whereas Syms [6] declares "the disease is undoubtedly primarily an inflammation," Grant [7] shrewdly observes that "the gross appearance and symptoms at menstrual periods and during lactation savour far more of an inflammation or mastitis than do those seen in an average case of chronic mastitis," and concludes that the disease is an abnormal epithelial hyperplasia. An interesting observation by Rutherford Darling [8] is that "oöphorectomy leads to atrophy and to changes (in the breast) identical to those met with in chronic mastitis."

Similarly, there is disagreement as to the frequency with which cancerous changes can be detected in mammæ removed for mastitis; for whereas Bloodgood [9] examined 222 out of 350 mastitis cases at Johns Hopkins Hospital and declared that "not one showed evidence, gross or microscopic, of carcinoma," Ewing [10] states that "50 per cent. of breasts excised for cystic disease show pronounced precancerous changes or miniature carcinomas." Between these extremes we find: [12]

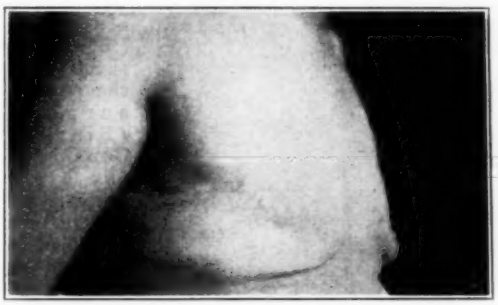
| | Per cent. | | Per cent. |
|---|---|---|---|
| Greenough and Hartwell | 10 | Lockwood .. .. | 20 |
| Warren .. .. .. | 13 | Finney .. .. | 10–50 |
| Verga (5 in 28) .. .. | 18 | Lahey [11] .. .. | 10–50 |

Bloodgood,[13] however, adds that in 3 out of 128 where partial removal of the breast had been done carcinoma developed later. In my series there were 3 out of 60 cases—i.e., 5 per cent. It seems established that, when malignant changes do occur, the site may be at any point from the ampulla of the duct to the most distant acinus of the corpus mammæ—at any part of what may be termed the mammary tree.

## Surgical Anatomy.

The female mamma consists of the true breast tissue—namely, the acini with their ducts (conveniently referred to as the corpus mammæ) encased in its fatty envelope (Stiles [14]). The approximate limits are from the second to

FIG. 2.



The result of an operation for "mastitis" in both breasts done at a large general hospital in London for a nurse who was then aged 21; a sensitive woman whose subsequent married life has been embittered by the (? unnecessary) mutilation.

the seventh rib vertically and from the edge of the sternum to the midaxillary line laterally; Spence's axillary tail runs up towards the axilla as high as the third rib. Stiles [14] also taught that the corpus mammæ is so intimately connected with the fibrous framework that the two cannot be separated, so that there is no capsule proper; the fibrous stroma is so broken up and branched at its periphery that it becomes directly continuous with the connective tissue framework of the fatty superficial tissue. The disposition of the fibrous scaffolding is beautifully portrayed in some of the older text-books.[14 17 18] In addition to the well-known suspensory ligaments of Cooper, fibrous processes pass from the deep surface of the gland to the pectoral fascia, sometimes even into the pectoral muscle, carrying with

them minute lobules of the gland. In the parous mamma at the end of lactation involution occurs, the corpus mammæ shrinks, and fat becomes deposited superficially and also on the deep aspect of the gland.

The blood-supply of the gland is derived from: (1) The second, third, fourth, and fifth perforating branches of the internal mammary. (2) Descending branches from the acromio-thoracic axis. (3) The principal supply comes by way of the long thoracic or external mammary branch of the axillary artery. (4) Small branches from the intercostals.

As each artery of supply approaches the margin of the gland proper it divides into two sets of branches, the one coursing superficially through the fatty envelope towards the nipple, and the other passing deeply into the substance of the corpus mammæ. This disposition, well seen by transillumination, influences the choice of the ideal incision for the operation of mastectomy—a term suggested by Grant.

The nerve-supply comes from: (1) Descending cutaneous branches of the cervical plexus. (2) Lateral and anterior branches of the second to the sixth intercostal nerves. (3) The gland itself (sensation), from the perforating terminal branches of the fourth, fifth, and sixth intercostals.

In addition there is probably a free supply of sympathetic nerves of whose course and origin nothing appears to be known, although it is highly probable that they follow the course of the arteries supplying the gland.

## Operation.

For non-malignant tumours of the breast the operations necessary may be divided into three classes.

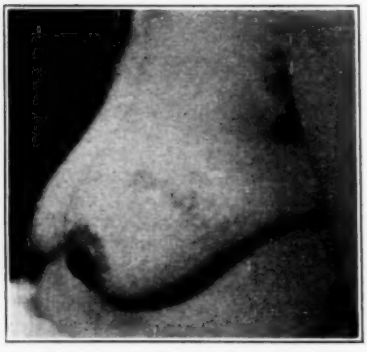
1. Actinomycosis and tuberculosis demand amputation with removal of the overlying skin, treating the disease as locally malignant.

2. Large innocent tumours such as advanced (so-called) cysto-adenoma and hydatid disease, where the whole corpus mammæ, together with its fatty envelope, has been destroyed, require a lenticular incision with preservation of as much of the overlying skin as is possible.

3. The majority (adenoma, fibro-adenoma, serous cysts, mazoplasia) need Thomas's operation and observation of the strictest conservation.

My interest has been centred on the last class and on the technique necessary to ensure the best cosmetic result compatible with the cure of the disease. "The operation is perhaps the easiest in surgery" (Binnie[1]). Considering the blood-supply, it is evident that the ideal site for the incision is in the lower hemisphere of the breast, and this corresponds with the site of election for cosmetic considerations. The incision advised by Warren[19] and recommended by Bickham falls upon the sulcus along the lower and outer circumference of the breast, whereas Fitzwilliams[20] says "I much prefer an incision extending well below the breast, whereby the breast is turned upwards and inwards, to that recommended by Warren, which was almost altogether on the outer side."

FIG. 3.



The result in a married multipara, a case of mastoplasia, aged 29. The scar has been marked with Indian ink.

I have used both these, but find good reasons for the adoption of a crescentic incision through the skin over the lower and outer aspect of the breast itself about half an inch from the line of the sulcus. These reasons are:—

1. The skin is healthier and the resulting scar more nearly "invisible." Even a trivial low-grade sepsis, not infrequently regarded as negligible in wounds accounted "clean," mars the quality of the scar.

2. The main trunks of the arteries escape severance and the nutrition of the tissues that are left is more vigorous, so that there is less post-operative shrinkage and distortion. This applies specially to the nipple, which has been known to slough from lack of blood-supply—a mischance that has not, however, befallen any of my cases.

3. Greater accessibility to the upper and internal portions of the corpus mammæ, where outlying lobules are apt to be overlooked.

FIG. 4.

An unmarried girl of 24, from whose left breast an adenoma in the lower outer quadrant was removed.

In whatever part of the breast, then, the tumour may be, a crescentic incision is made on the skin of the breast itself, with its centre in the lower and outer quadrant; scratches are made at right angles to the line of the proposed incision to ensure accurate coaptation of the skin edges afterwards. The scalpel should be of the sharpest. The incision is deepened until the breast tissue proper is reached and then, keeping close to the corpus mammæ and preserving every scrap of fibrous tissue and fat, the lower margin is defined and the whole breast turned over, upwards and inwards in the way originally described by Thomas.

At this stage the enucleation of an encapsuled tumour (e.g., an adenoma) is done through a radial incision in the deep aspect of the corpus mammæ, but in the majority of cases of mastitis or mazoplasia it is necessary to remove the whole corpus mammæ. On the deep surface of the gland, especially in parous subjects, there is sometimes a thin layer of fat, which should not be removed. Occasionally, however, there is found a lobule of the gland which lies deep to the fascia covering the pectoral muscles, embedded in the muscle and connected to the main corpus mammæ by a narrow isthmus only. Unless the breast is turned over carefully such an outlying lobule may be left behind.

The most meticulous care is necessary in dissecting away the anterior surface of the gland; interlobular tongues of fat should not be sacrificed, nor the fibrous ligaments of Cooper, along which vessels and lymphatics run. The strand of tissue between the nipple and the corpus, consisting of the main ducts, is carefully isolated and severed close to its junction with the corpus mammæ.

Arrest of hæmorrhage should be very complete and achieved without including in the ligature a mass of surrounding tissue. Since the vessels are severed close to the gland the bleeding points are numerous, at least five or six on the inner side from the perforating arteries, two or three small branches from below derived from the intercostals, about three on the outer side from the external mammary, and two or three above from the acromio-thoracic.

A purse-string suture of fine catgut is often necessary to ensure eversion of the nipple, and a few sutures

sometimes help to refashion the fatty and fibrous remains in the image of a normal breast. A small 24-hour drain is sometimes advisable. The skin requires accurate and gentle suture with fine fishing-gut, and here we may keep in mind Lord Moynihan's [21] words.

"The cleaner and the gentler the act of operation the less the patient suffers . . . . the more exquisite his healed wound, and the happier his memory of the whole incident. . . . . The appearance of a wound is often the best index to the quality of the work that has been done throughout the operation."

To ensure the best scar, stitches should be removed on the fifth or sixth day.

### PRESERVATION OF THE NIPPLE.

The psychological and æsthetic importance of the nipple to a woman is not readily appreciated by the masculine mind. Reduction in the size of the mamma, especially if the characteristic contour can be retained, she bears with equanimity, but the nipple is a sign-manual of her sex and spares her the stigma of "mutilation." Moreover, in the removal of non-malignant tumours, sacrifice of the nipple is more than undesirable—it is quite unnecessary. Tumours proper (e.g., adenomata) never involve that portion of a main duct which lies distal to the ampulla and which, traversing the nipple, is lined by squamous epithelium. The cysts of mazoplasia sometimes occur first below the musculature of the nipple but none within the nipple,[22] and are never so close to the surface as to involve ablation of the nipple. The cysts arise mainly from the portion of the ducts which lies between the ampullæ and the acini, rarely from the ampullæ themselves. The stretch of duct reaching from the surface to the ampulla can therefore be preserved with safety in all cases. It is noteworthy that the nipple thus left never becomes unduly sensitive, nor has the nutrition of the part ever been jeopardised in any of my cases.

## Palliative Treatment.

The fundamental condition in so-called chronic mastitis has been shown by Lenthal Cheatle to be a "desquamative epithelial hyperplasia." Whether the formation of cysts is an inevitable ultimate sequel, certain it is that in a considerable percentage gross cysts do eventually develop, and in these cases palliative treatment can do little more than mitigate the severity of the pain. For the most part they are fated to come to operation, or to bear the penance of constant pain and dread of malignant disease. Nor does palliative treatment influence appreciably those complicated by the presence of adenoma or fibro-adenoma. There remains a residuum of early cases in which certain measures appear to arrest the pathological process and to dispel the disquieting symptoms.

The 60 cases recorded were treated between 1921 and 1929 and most were given a short course of treatment before operation was discussed. Even when operation is inevitable, a preliminary course of treatment serves to satisfy the patient that the dreaded operation is not being lightly undertaken. In a large number of cases, not recorded, perseverance with palliative measures sufficed to bring about a symptomatic cure and operation was unnecessary. The measures which have proved useful are the following:—

1. Inunction with iodex and radiant heat for 20–30 minutes proved efficacious in many cases.

2. Ultra-violet ray treatment (2 minutes increasing to 15 minutes) appeared to do good in some cases.

3. Hot bathing followed by centripetal massage often causes great relief of pain and diminution in the size of the tumour.

4. A mercurial ointment occasionally soothes pain and appears to diminish the swelling—*ung. hydrargyri* or *ung. hydrargyri oleatus*.

5. X ray treatment may be expected to arrest the morbid process, but the analogy with carcinoma is not sufficiently close to warrant high hopes. In a recent case, however, relief from pain has certainly been achieved. (? suggestion.)

6. In all cases firm bandaging or support by a well-fitting brassière is advantageous.

7. Probably the most efficacious weapon will be found in sun-baths. Only in a few of my cases has it been practicable to secure this, but in each case the benefit was unmistakable. It is said that in countries where women habitually wear no clothing above the waistline the disease is unknown; such a sweeping generalisation must be received with caution but my limited experience tends to confirm it.

## Analysis of Cases.

1. The conservative operation as outlined above has been done in 50 out of 60 cases recorded for non-malignant tumours of the breast; in the remaining ten amputation was done. 2. The youngest patient was 20 years old and the tumour was a "fibro-adenoma." 3. The youngest case of mazoplasia was 23 years, the oldest 63 years. 4. Only five out of 60 were unmarried. 5. In every case over the age of 45 and in most of the others the whole corpus mammæ was removed; 12 of the 60 cases had a segment only of the gland removed, but of these three were cases of adenoma. 6. Forty operations were done on the left side, 21 on the right side; one case required removal of both breasts. 7. In the 50 conservative operations the nipple was preserved in every case and in none of these was there any untoward consequence. 8. The average age was 42·3 years. 9. The results are almost uniformly good. Sometimes a neuralgic pain, usually trivial, is complained of along the course of the descending branches of the cervical plexus, or sometimes along the distribution of the intercostohumeral. These pains are more common amongst the cases of mazoplasia in which a segment only of the gland has been removed, and the impression grows stronger that in this disease it is always the wiser course to remove the whole of the corpus mammæ. 10. In two cases the pathologist's report was "duct-carcinoma." In both these the radical operation was done later (1927 and 1928) and in both there is no sign of recurrence. In a third case the report was "carcinoma." The patient declined the radical operation and had a prophylactic course of X ray treatment. Nearly two years have elapsed without any evidence of recurrence or metastasis.

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## EXPERIMENTAL OBSERVATIONS ON THE ACTION OF RADON ON THE SPINAL CORD.*

By Hugh Cairns, M.B. Adel., F.R.C.S. Eng.,
assistant surgeon to the london hospital;
and
J. F. Fulton, D. Phil. Oxf., M.D. Harvard,
fellow of magdalen college, oxford.

(*From the Laboratory of Physiology, Oxford, and the London Hospital.*)

Experiments designed to determine the maximum dosage of radon that might be applied safely to malignant tumours of the central nervous system have disclosed a striking relation between the dose of radon and the time of appearance of symptoms of destruction of nervous tissue. Cats and monkeys were employed, and the spinal cord was selected for investigation since symptoms of its destruction can be quickly recognised; symptoms that follow destruction of the higher regions of the central nervous integration are not so easily observed, and are difficult to interpret.

Radon seeds of varying doses, but always 1·5 cm. long and screened by 0·3 mm. of platinum, were placed, with aseptic precautions, alongside the spinal cord in the lower dorsal region. This preliminary communication and the Table that follows are based on experiments in which the seeds were implanted outside the dura. The animals were carefully observed during the two or three weeks after operation, and several were studied for a period of four or five months.

One animal showed weakness of a hind extremity immediately after operation, and this was discarded, as the cord had undoubtedly been injured while the seeds were being inserted. In every other instance during the first 24 hours after operation there was no sign of weakness of the hind limbs or of loss of sensation. With an overwhelming dose of radon (e.g., 31 millicuries) signs of weakness of the hind extremities appeared 30 hours after operation. Except for loss of position sense no sensory disturbance could be detected at this time. The paraplegia always became complete three to four days after the onset of the first symptom, even though in some experiments the seeds were withdrawn 48 hours after they had been inserted. When smaller doses of radon were used the time of onset of the first symptom was later, and the appearance of complete paraplegia was correspondingly delayed. In cats any dose greater than 9·5 mc. produced complete paraplegia; with a dose of 9 mc. or less the paraplegia was incomplete or slight; and with doses of 4 mc. or less there were no obvious neurological symptoms at any time. Monkeys proved more resistant than cats, for a dose of approximately 12 mc. produced only slight weakness. The following Table gives a summary of our results.

The first symptom displayed by the animals after insertion of the radon was loss of position sense. This sometimes preceded by several hours the appearance of definite motor weakness. The animals invariably passed through a stage of extension before developing a characteristic complete flaccid paraplegia (in flexion), which was not unlike the paraplegia in flexion seen in human beings several weeks after a complete transverse lesion of the spinal cord. In two instances the animals remained permanently in extension and in these subsequent histological examinations showed that the dorsal quadrants were destroyed while the ventral regions remained largely unaffected.

*Table showing the Effect of Increasing Doses of Radium Emanation upon the Spinal Cord (Applied Outside the Dura). Screening 0·3 mm. Platinum.*

C.D.(M) = Corrected dose (millicuries).
W.K. (d) = Weakness (days).
Pp. = Paraplegia (comp., complete; incomp., incomplete).

| C.D.(M) | W.K. (d). | Pp. | C.D. (M) | W.K. (d). | Pp. |
|---|---|---|---|---|---|
| | *Cats.* | | | *Cats.* | |
| 31·3 | 1 – | Comp. | 6·6 | 6 | Slight. |
| 28·8 | 2 | ,, | 6·3 | 6–8 | ,, |
| 27·9 | 2 | ,, | 3·7 | None. | None. |
| 24·7 | 4 | ,, | 3·1 | ,, | ,, |
| 16·2 | 2–3 | ,, | 2·8 | ,, | ,, |
| 16·3 | 4 | ,, | 0·9 | ,, | ,, |
| 10·0 | 5 | ,, | | | |
| 9·8 | 5 | ,, | | *Monkeys.* | |
| 9·2 | 5 | Incomp. | 11·8 | 3 | Slight. |
| 9·0 | 4 | ,, | 9·0 | None. | None. |
| 7·3 | 8 | Slight. | 6·1 | ,, | ,, |

In these experiments the radon seeds were applied to the dorsal surface of the cord, and the destruction proceeded in a ventral direction, the posterior columns being affected first and the ventral tracts last. We believe that the period of extension is one in which the posterior columns and possibly other structures in the dorsal quadrants of the cord are impaired while the ventral quadrants are normal. Further work is being done on this problem. Full details concerning the pathological character of the lesions and the degenerations will be published later.

We desire to thank Prof. Sidney Russ for supplying us with radon, and for his help and criticism. The expenses of the work were defrayed by the Charles Bingham Bolton Fund for Neurology.

* A paper read before the Society of Neurological Surgeons on Nov. 23rd, 1929.

## RELATIVE VALUE OF VARIOUS SOLUTIONS FOR SCLEROSIS OF VARICOSE VEINS.

By David Levi, M.S. Lond., F.R.C.S. Eng.,
assistant surgeon, infants hospital, vincent-square; surgical registrar, royal national orthopædic hospital.

The ideal solution for injection of varicose veins has not yet been found. A list of the various solutions in common use at the present time is set out below, and the advantages and disadvantages peculiar to each are discussed.

The susceptibility of veins to a sclerosing injection varies from individual to individual, and this personal element can neither be eliminated nor ignored. My generalisations are drawn from observations on different series of patients extending over a period of four years. The total number of injections given amounts to 4000, and they have been divided into four groups according to the drug used.

### FOUR SCLEROSING AGENTS.

1. *Glucose.*—Up to 5 c.cm. of a 66 per cent. solution was injected at a time. The advantages of this solution are that the substance injected is innocuous and does not cause any systematic disturbance. It produces clotting over large areas of vein, but the clot tends to be a loose one. The

treated vein is tender to touch for a period of five to six weeks; it looks red for two weeks or more. There is a tendency for the clot to break up, and of the recorded instances of pulmonary embolus resulting from vein injection the majority have occurred following the use of glucose (Olson,[1] Levi [2]).

2. *Sodium Salicylate.* — Solutions of several strengths are used, the choice depending on the susceptibility of the vein treated. It is usual to start with a relatively weak solution and work upwards. The advantages of this substance are that it produces a limited sclerosis and causes obliteration of two or three inches of vein wall. The resulting clot is firm and incorporated with the vein. There are, however, several disadvantages attending the use of salicylate. The first is that the injection is painful and accompanied by cramps in the calves. If the injection is made into subcutaneous tissue gangrene, followed by ulceration, nearly always occurs. Sometimes the injected fluid leaks back through the puncture made in the vein wall by the needle. Even a small quantity of salicylate in the tissues will act as an irritant. Quite a large percentage of patients do not "take," and have to be given numbers of injections of increasing strengths. In at least two of my patients recanalisation of the sclerosed vein occurred within 18 months of the time of injection. Salicylate solutions go brown on keeping. Attempts have been made to overcome the cramps produced by adding local anæsthetics to the salicylate solution; the most popular preparation is lithium salicylate with the addition of tutocaine.

3. *Quinine and Urethane.*—2 to 3 c.cm. were injected at each sitting. The quinine is the active element and it destroys the endothelium of the vein; the urethane is added for its anæsthetic properties. The great advantage of this preparation is that it usually "takes" and consequently there are very few refractory veins, and the total number of injections is thereby reduced. It is painless at the time of injection, but there is often a complaint of cramp five to six hours afterwards, especially if the patient has been sitting for any length of time, and gets up suddenly. The pain rapidly passes. The reaction induced by the quinine is a severe one, and sometimes the whole saphenous vein will become filled with clot following one piqûre. This clot remains red and painful for six weeks or so. In a small minority of people dizziness is apparent at the time of injection, and in women some disturbance of menstruation has been observed. The tissues are very intolerant of the injection, and a slough taking weeks to separate, leaving a slowly healing ulcer, is the invariable accompaniment of faulty technique. If a thin-walled vein is injected the sclerosing action is so severe that I believe the vein wall becomes permeable and the injection leaks through. Some of the sloughs appearing three to four weeks following treatment are possibly due to this cause, and are not always the result of a subcutaneous injection.

4. *Sodium Morrhuate 5 per cent.*—This substance was used extensively years ago, and was the chief constituent of a very famous cancer "cure." It was also administered, as a 2 per cent. solution either intramuscularly or intravenously, for tuberculosis. Its main disadvantage was the thrombosis which followed the intravenous administration, and on account of this the treatment fell into disrepute. Sodium morrhuate is much less irritant than salicylate or quinine, and does not produce sloughing if injected into the subcutaneous tissues. The reaction it produces in the vein is much less severe than quinine. The injection is almost painless and the discomfort afterwards is not great. I have not seen an ulcer following an injection of sodium morrhuate. Most of the patients treated reacted to the first injection. There is not the same tendency to extensive clot formations as there is with quinine and urethane. No general toxic symptoms have been observed.

### VALUE OF THE TREATMENT.

From perusal of the vast literature of this subject I have formed the following conclusions.

*Mortality* is due almost entirely to pulmonary embolus. McPheeters and Rice [3 4] record seven deaths among 53,000 patients, Kilbourne [5] one in 5000, and Dixon five in 5400. The risk, therefore, is small—much smaller than the operative mortality, which is 0·4 per cent. There were three main causes of the recorded fatalities: the first was the injection of veins in the presence of an acute phlebitis; the second was the injection of a sugar solution, which resulted in three deaths, McPheeters and Rice [4]; while the third was the use of large quantities of injection material. Hohlbaum [6] used 60 c.cm. of an iodine solution. Therefore if sugar solution is avoided, if the total bulk of chemical injected is under 5 c.cm., and if the injection is not given with coexisting acute phlebitis, the treatment appears absolutely safe. There is no recorded death from pulmonary embolus, the direct result of treatment on these lines.

*Recurrence* is sometimes caused by recanalisation of the injected vein. More often it is due to new varicose veins appearing. It follows operative excision in 30 per cent. of patients, but in those injected it is only 6 per cent., according to Kilbourne, and 5 per cent. according to Sicard. My figures agree more with Sicard's, though the total number of patients is small, especially when compared with that of Sicard, who had 15,000 patients and has given them 120,000 injections. Recurrence, however, is a minor complication, which may be treated by reinjection.

*Chemical gangrene* follows the injection of substances into the subcutaneous tissues. Payne [7] records 13 instances in 1500 patients, Higgins [8] 12 in 200 patients. That this is not always the result of faulty technique I am quite sure. Kilbourne recognises that it is sometimes due to leakage through the puncture made by the needle in the vein wall. McPheeters and Rice suggest that sometimes the injected material osmoses through a thin vein. This complication can, however, be overcome by:—

1. The use of a needle with a short bevel and a moderately small bore.
2. The withdrawal of blood before injecting the chemical.
3. The retention of the needle in the vein for a minute or two following the injection.
4. The application of a small wool pad fixed with strapping or bandage rather than the use of a collodium dressing.
5. The use of sodium morrhuate if a thin-walled vein is to be injected rather than quinine and urethrane or salicylate which produce a severe reaction in many patients.

*Refractory Veins.*—Angle,[9] in America, injected 10 c.cm. of a mixture of sugar and sodium chloride into one individual 25 times, and repeated the operation 27 times in another. Such persistence is to be deprecated. It is better to change one's technique if a vein does not become obliterated following one or two injections into it. It has been my experience that if quinine and urethane is used, and the injection made when the patient is in bed in the evening, the vein will be thrombosed on waking in the morning. Injection should be made with the leg horizontal in bed. No tourniquet is used, and the patient is enjoined not to move for an hour after the treatment.

This technique is only followed in patients who have proved refractory.

*Pigmentation* along the site of the thrombosed vein is common and sometimes permanent, but it becomes progressively less over a period of 18 months.

*Contra-indications* may be summarised as (1) acute phlebitis. Forestier,[10] quoted by Sutton, says that "no injection should be given for ten years following phlebitis." About half of the recorded deaths following injections have been due to this dictum having been disregarded. (2) Intermittent claudication. (3) Deep thrombosis, due to any cause. (4) Phlegmasia alba dolens (Takats [11]). General diseases, such as cardiac and renal disease, are not contra-indications except during their terminal stages. Injection is safe in pregnancy, but during the latter months it appears advisable to wait till after delivery of the child. Varicose veins of the vulva react as well as varicose veins in other situations.

I should like to thank the surgical staff of St. Mary's Hospital, Paddington, and Mr. Laming Evans, for allowing me to include observations made from their patients.

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# CLINICAL AND LABORATORY NOTES

## TWO CASES OF GLANDULAR FEVER SIMULATING TYPHUS.*

BY MAITLAND RADFORD, M.D. LOND., D.P.H.,
MEDICAL OFFICER OF HEALTH, BOROUGH OF SHOREDITCH:
AND
J. D. ROLLESTON, M.D. OXF., M.R.C.P. LOND.,
MEDICAL SUPERINTENDENT, WESTERN HOSPITAL, LONDON COUNTY COUNCIL.

### CASE ONE.

ON March 27th one of us (M. R.) was asked by a practitioner to see a girl, aged 16, who had been taken ill suddenly on March 21st, and on the 25th had had a well-marked blotchy rash which the doctor thought suggestive of typhus. The early symptoms were headache, nausea, pains in the back and legs, and a general feeling of illness. On the 27th the rash had faded considerably, but was still visible. The temperature in the axilla was 102° F. The skin also showed some bites probably due to lice. Under the circumstances it seemed advisable that the case should be regarded as one of typhus and that the patient should be removed to a fever hospital. By a coincidence, J. D. R., in connexion with a discussion on tropical typhus to be held on the following day,[1] rang up the chief office of the Metropolitan Asylums Board shortly after the case had been notified to inquire about the last cases of typhus reported in London.[2] He was, therefore, only too pleased to accept the suggestion that the case should be sent to his hospital.

On admission to the Western Hospital on March 27th the girl showed a faint macular rash on the face, chest, and abdomen. The tongue was thickly coated. Some rhonchi were heard at the base of both lungs. The patient looked ill but was quite sensible. Temperature 104° F., respirations 32, pulse 106. There were numerous lice on the body as well as in the scalp.

For the next ten days the temperature remained at a high level and then began to assume an intermittent type which persisted until April 27th, when a normal level was finally reached. The patient was at first very drowsy and difficult to rouse but remained sensible and showed no signs of delirium. For a few days she suffered from retention of urine. The diazo reaction in the urine was persistently negative.

The true nature of the illness was not suspected until April 12th, the twenty-fifth day of disease, when the glands in the posterior triangle of the neck became enlarged and painful, and four days later enlargement of the axillary and inguinal glands was detected and a slight increase in size of the spleen. The possibility of glandular fever then first suggested itself and a specimen of the blood was sent to Dr. J. E. McCartney, Director of Research and Pathological Services, M.A.B., who made the following report:—

"Differential count: polymorphs 34 per cent., large lymphocytes 56 per cent., small lymphocytes 9 per cent., large mononuclears 1 per cent., eosinophils and mast cells nil. The above results show that there is a relative increase in the number of lymphocytes, particularly the large lymphocytes, some of which have a few small red granules in the protoplasm. The polymorphs show signs of immaturity. There is hardly a multilobed cell to be seen, and in many the nucleus is merely horse-shoe shaped. One or two neutral myelocytes were seen. The red cells vary in size, but there is no poikilocytosis. One nucleated red cell was seen. No punctate basophilia was observed. No parasites—i.e., spirochætes or malaria organisms—were seen. The total cell count is not known but the blood picture shows the appearance of a case of acute glandular fever (infective mononucleosis)."

The total white cell count was subsequently found by Dr. L. J. M. Laurent to be 8320 per c.mm. The following examinations of the blood were also made by Dr. McCartney on March 29th.

Weil-Felix reaction with *proteus* X 19 "H" strain negative. Widal reaction negative to *B. typhosus*, *B. paratyphosus* A and B. Wassermann reaction ++.

Subsequent examination of the blood on April 1st and 7th for the Weil-Felix and Widal reactions yielded the same result, and the Wassermann reaction of the blood examined on April 7th was again ++. A culture of the blood taken on April 1st showed after 24 hours' incubation a growth consisting of a Gram-negative bacillus of the coliform type and a small Gram-positive cocco-bacillus of the diphtheroid type. Neither of these organisms were identified as belonging to any of the pathogenic groups and were therefore regarded as contaminants. The Wassermann reaction was performed for the third and last time on May 13th and was still found to be ++.

### CASE TWO.

The patient's mother, a woman aged 36, was taken ill with somewhat similar symptoms on March 26th and

* These cases were mentioned in THE LANCET last April (1930, i., 834 and 936) under the heading of Infectious Disease in England and Wales.

[1] Proc. Roy. Soc. Med., 1930, xxiii., 1030; See also THE LANCET, 1930, i., 750.

[2] See THE LANCET, 1928, i., 1224.

was sent to the Western Hospital on April 3rd as a case of typhus.

On admission she presented a faint mottling of the chest and abdomen. There were signs of bronchitis. The patient was very deaf but was quite sensible. Temperature 103·4°, pulse 104, respirations 30.

The clinical and hæmatological picture in this woman was very similar to that of her daughter. The temperature at first kept high and then assumed an intermittent course before becoming normal on the thirty-fifth day of disease. Enlargement of the glands of the neck were first noticed on the nineteenth day of disease and a few days later the axillary and inguinal glands became enlarged. No enlargement of the spleen, however, was detected. In both the mother and daughter convalescence was rather slow, and it was not until May 21st that they were discharged on the fifty-eighth and sixty-first day of disease respectively. The enlargement of the glands in the axilla and groin had then subsided, but the cervical glands were still enlarged in both patients.

The following reports on the mother's blood were made by Dr. McCartney :—

"April 5th: Weil-Felix reaction negative. Widal reaction negative to *B. typhosus*, *B. paratyphosus* A, and *B. paratyphosus* B. Wassermann reaction negative. Blood cultures showed an organism with the characteristic features of *Streptococcus faecalis*, which was regarded merely as a contaminant.

Differential count, April 17th: Polymorphs 33 per cent., large lymphocytes 62 per cent., small lymphocytes 2 per cent., large mononuclears 3 per cent. Eosinophils and mast cells nil. The polymorphs show signs of immaturity, in many of them the nucleus is not lobed but merely horse-shoe shaped. The red cells vary considerably in size, but there is no poikilocytosis. No nucleated red cells were seen. A few of the red cells showed punctate basophilia. No parasites were seen. The total cell count is not known, but the blood has the appearance of acute glandular fever (infective mononucleosis)."

The total leucocyte count was subsequently found by Dr. Laurent to be 7640 per c.mm. A second examination of the blood made on May 8th differed from the first in that the Wassermann reaction was positive, while the differential count (polymorphs 19 per cent., eosinophils 5 per cent., small lymphocytes 6 per cent., large lymphocytes 69 per cent., large mononuclears 1 per cent.) was remarkable for the high percentage of eosinophil cells.

COMMENT.

The resemblance to typhus in the two cases under consideration were the sudden onset, the high fever, the bronchitis, deafness, retention of urine in the younger patient, and the positive Wassermann reaction. On the other hand, the points against such a diagnosis before the appearance of the glandular enlargement were the indefinite character of the eruption, the negative diazo reaction, and the absence of any known source of infection.

Although there is no characteristic eruption in glandular fever, several writers such as Glanzmann,[3] Tidy,[4] and Evans and Robb[5] have recently drawn attention to the occurrence of rashes resembling scarlet fever, measles, rubella, or the rose spots of enteric fever, but we have not found any previous mention of an eruption in glandular fever resembling that of typhus.

The immunity from typhus which London has enjoyed for many years and the absence of any known exposure to infection seemed to be an even more important argument against the diagnosis of typhus. As J. D. R. had occasion to remark at the aforesaid discussion on tropical typhus[1] during the 30 years in which he had been in fever practice there had been only 71 cases of typhus, of which he had seen about a dozen, admitted to the Metropolitan Asylums Board hospitals, and the last case in which the diagnosis had been confirmed was in 1918.

After the woman's admission to hospital, the father and the only other child, a girl aged 9, was examined by M. R. in order if possible to trace the course of infection. Though he was in a bad state of health, having recently undergone malaria treatment for general paralysis, the father was not suffering from any acute illness, and examination of his blood by Dr. F. H. Teale gave the following results :—

Wassermann reaction completely positive. Weil-Felix reaction negative. Widal reaction: agglutination with *B. paratyphosus* B completely positive in dilutions 1 : 25, 1 : 50, 1 : 125, 1 : 250, 1 : 500. Culture: no growth of organisms. No organisms of the typhoid or paratyphoid group were isolated from the stools.

The child appeared to be in good health and gave negative Widal, Wassermann, and Weil-Felix reactions, but on April 12th we learnt that the younger patient's cousin had been admitted to St. Bartholomew's Hospital with symptoms resembling those of the supposed typhus cases, and on a visit to this hospital we found that she had been diagnosed as suffering from glandular fever. The positive Wassermann reaction which at first seemed to favour the diagnosis of typhus was afterwards thought to be connected with the paternal syphilis, but on inquiry it was found that the father had contracted his infection after the daughter's birth, and we have since been informed that several cases of glandular fever in which no other evidence of syphilis was obtained gave a positive Wassermann reaction. The late development of any obvious glandular enlargement is by no means unusual in glandular fever, as Glanzmann and Evans and Robb have recently shown, and as one of us (J. D. R.) had an opportunity of observing through the kindness of Dr. Cecil Wall in several cases at the London Hospital, as well as in another case sent to the Western Hospital as scarlet fever, in which the adenitis did not appear till the thirteenth day of disease.

[3] Glanzmann, E.: Das lymphaemoïde Drüsenfieber, Berlin, 1930.

[4] Tidy, H. L.: Brit. Med. Jour., 1930, i., 881.

[5] Evans, G., and Robb, W. A.: Brit. Med. Jour., 1930, i., 1039.

## RETROBULBAR NEURITIS AND DISSEMINATED SCLEROSIS.

By C. P. Symonds, M.D.Oxf., F.R.C.P. Lond.,

PHYSICIAN IN CHARGE OF DEPARTMENT FOR NERVOUS DISEASES, GUY'S HOSPITAL; ASSISTANT PHYSICIAN TO THE NATIONAL HOSPITAL, QUEEN-SQUARE.

It is well recognised, both by ophthalmologists and neurologists, that acute retrobulbar neuritis is a common symptom of disseminated sclerosis and may occur as the first manifestation of this disease. The literature upon the subject has been recently reviewed by Brain,[1] who concludes that "every case of retrobulbar neuritis for which no other cause can be found should be regarded as a possible case of disseminated sclerosis," and that "it must be borne in mind that the absence of further symptoms for many years does not exclude the possibility of the ultimate development of disseminated sclerosis."

The question of frequency of this symptom in disseminated sclerosis is one that has interested me for some time, and in view of the relative paucity of papers dealing particularly with this point it has seemed to me worth recording some personal observations. These are taken from a series of cases seen in private practice under conditions which permitted a careful examination of the history obtained from patient and relatives with particular

[1] Brain, W. Russell: Quart. Jour. Med., 1930, No. 91, p. 343.

reference to visual disturbance. This is a matter of some importance, for a story of retrobulbar neuritis in the past, often attributed at the time to some plausible infective or toxic cause and ending in recovery, is not likely to be connected in the patient's mind with a subsequent weakness or numbness of the limbs. Moreover, the memory of many patients with disseminated sclerosis is defective by reason of their disease. Unless, therefore, the point is carefully inquired for in every case the incidence is likely to appear lower than it really is.

In a series of 139 cases of disseminated sclerosis in which the clinical diagnosis appeared certain, a history of an attack of retrobulbar neuritis was obtained in 39, or 28 per cent.

Of equal interest is the proportion of cases in which retrobulbar neuritis is the *first* symptom of the disease. This has been estimated by American and French authorities, quoted by Brain, as something under 10 per cent. In the present series the onset of retrobulbar neuritis preceded all other symptoms in 20 cases and appeared together with other symptoms at the onset in another six. In two-thirds, therefore, of the cases in which retrobulbar neuritis occurred, it marked the onset of the illness, and of the total number of 139 cases under review retrobulbar neuritis occurring alone was the first symptom in roughly 15 per cent.

A further question of interest in relation to the ætiology of those cases of retrobulbar neuritis usually regarded by the ophthalmologist as of uncertain or obscure origin is the interval, when retrobulbar neuritis is the first symptom of disseminated sclerosis, before other signs of the disease appear. Of the 20 cases in this series, further symptoms developed in under 2 years from the onset of the retrobulbar neuritis in ten cases, in over 2 years but under 5 years in five cases, and in the other five cases the latent interval was over 5 years.

The following summaries from the notes of three of these cases illustrate the length to which this latent interval may extend :—

1. Mrs. A, aged 42, seen Jan. 1st, 1930. Three years ago partially lost power in the legs. At the same time use went out of left hand. Improved, but recently walking worse. Diplopia during past month. Admitted on questioning that in 1913 she quite suddenly lost the sight of one eye. This recovered in about three weeks. Then the other eye went blind, and recovered in a similar period. On examination pallor of both discs, nystagmus, intention tremor left upper limb, spastic weakness of lower limbs, with extensor plantar responses.

2. Miss B, aged 24, seen June 12th, 1929. One month ago an attack of vomiting and vertigo. During past few days numbness in right hand. Admitted on questioning an attack ten years previously at the age of 14 of dimness of vision in both eyes associated with severe headache. Was seen by an ophthalmic surgeon who diagnosed retrobulbar neuritis. On examination pallor both discs, nystagmus, loss of postural sense fingers of right hand, absent abdominal reflexes, right plantar response extensor.

3. Mr. C, aged 60, seen August 24th, 1927. Two years ago noticed difficulty in walking which has progressed. Eighteen years ago suddenly lost vision in right eye. Diagnosed retrobulbar neuritis. Saw many ophthalmic consultants with various opinions as to cause; sight improved. Five years ago left eye similarly affected and improved. On examination primary optic atrophy with bilateral central scotoma, nystagmus, slight spastic weakness of left upper limb, and marked spasticity and weakness of both lower limbs, with extensor plantar responses. The Wassermann reaction in blood had been tested many times, and was found negative on all occasions.

It follows that in a case of retrobulbar neuritis of obscure origin disseminated sclerosis remains a possible cause, even if no further signs of this disease have developed after a period of 10 or 15 years.

# MEDICAL SOCIETIES

## ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE.

AT a meeting of this Society on June 19th, with Dr. G. CARMICHAEL LOW, the President, in the chair, a paper on the

### Pathology and Treatment of Sprue

was read by Dr. N. HAMILTON FAIRLEY. Having had the doubtful advantage of suffering from sprue for two years, he said, he had been able to assess the value of various forms of treatment on his own *corpus vile*. As regards causation, there was only one recent piece of positive evidence—namely, Mackie's isolation of a pleomorphic organism resembling *Bacillus mallei*—and none of the ætiological theories had in any way modified the treatment. Pathologically, the disease was essentially an atrophic degeneration of the digestive tract, with megaloblastic inflammation of the bone-marrow. The intestinal lesions, which were primarily inflammatory and secondarily atrophic, had a notoriously patchy distribution and, in the later stages, implicated the whole tract. At times, however, the main brunt of the attack might fall on the ileum, the jejunum, the stomach, or the tongue. Dr. Fairley suggested that derangement of the ileum specially underlay defective absorption of fat, vitamin D, and calcium, and that jejunal involvement, leading to an inevitable decrease in the secretion of succus entericus, prevented normal splitting of cane sugar, lactose, and maltose. Abnormal fermentation of the resulting disaccharide residue was largely responsible for abdominal distension and the acid, gaseous stools so characteristic of sprue, while their increased fat content contributed largely to their bulkiness. Involvement of the stomach was indicated by the frequency of defective acid secretion, and, as in pernicious anæmia, deranged gastric secretion probably underlay the megaloblastic hyperplasia of the marrow and the megalocytic anæmia so characteristic of sprue. No essential relationship, however, exists between megalocytic anæmia and achylia gastrica, for several of the present series showed anæmia of this type associated with a free secretion of HCl. Dr. Fairley thought that the aplasia of the megaloblastic marrow might result from malnutrition, being analogous to the corresponding changes produced in the normal megaloblastic marrow of pigeons undergoing starvation. It had been shown that total as well as the ionic serum calcium was often reduced in sprue, and that this reduction was unaccompanied by an increase in the inorganic phosphorus. Marked lowering of the serum cholesterol was a characteristic finding in the severer cases.

#### TREATMENT.

The essential principles in the treatment of sprue might be summarised as follows: (1) alimentary rest; (2) restoration of the blood to a normal condition; (3) reinforcing demonstrable deficiencies such as lowered blood calcium and defective HCl secretion.

The most rational method of obtaining alimentary rest was by administration of a high protein, low fat, low carbohydrate, and adequate vitamin diet. The effects of a high protein diet were very obvious clinically since the stools showed a fall in their fat content, became neutral or alkaline in reaction, and rapidly decreased in bulk and number, while abdominal distension and intestinal flatulence disappeared. During the first two or three weeks weight may be lost or little gained, but once the bowel has been adequately rested and the anæmia rectified, higher caloric diets were well tolerated. Where patients were specially emaciated or the weight-curve fails to show the customary rise, insulin in doses of 6 to 12 units daily might be employed with striking benefit.

In all cases of megalocytic anæmia Dr. Fairley had given liver extract in full dosage (=1¼ lb. daily). Steady improvement in the red cell counts and percentage of hæmoglobin had followed, and generally a reticulocyte response whose intensity was inversely proportional to the gravity of the anæmia. Anæmias not frankly megalocytic in type had also improved under this régime, but reticulocyte response was absent. It has not yet been ascertained to what extent purely dietetic measures were responsible. Where the total serum calcium was below 9·0 mg. per 100 c.cm., calcium lactate or calcium and sodium lactate were administered, and in special cases irradiated ergosterol (vitamin D) was also given. In addition, a low fat diet was always instituted. Restoration to a normal blood calcium level invariably followed treatment along these lines, and generally paralleled improvement in alimentation. HCl was supplied in adequate dosage to all cases where its secretion was proved defective.

After prolonged experience of tropical sprue, Dr. Fairley is convinced that clinical observation should always be reinforced by biochemical and hæmatological data whenever possible, and also that in a disease so notoriously liable to relapse every patient should from time to time report for medical examination. Nor should treatment cease with discharge from hospital. Over-fatigue, extremes of temperature, and cold and chill must be avoided; and for many months, or even years, the diet may need careful supervision, especially in regard to carbohydrate excess. In cases of achylia gastrica and achlorhydria continued administration of HCl and a maintenance daily dose of liver extract equal to ¼ lb. of the fresh organ is advised until such time as normal gastric secretion be restored.

DISCUSSION.

Colonel F. P. MACKIE agreed with Dr. Fairley in his main points. He had been associated with him in researches on sprue for so many years that much of the work that led up to this paper had been done conjointly.

Dr. P. MANSON-BAHR, as a result of a study of 200 cases of sprue treated during a survey of seven years' work at the Hospital for Tropical Diseases, was able to show graphs which illustrated from strictly clinical observation the bases of many of the principles Dr. Fairley had laid down. The increase in body-weight corresponded in a remarkable way with the decrease in the amount of stool passed, and the curve in improved nutrition runs parallel with the improvement in the blood as graphed in results of red cell counts and hæmoglobin values. His results, which were being published in the near future, indicated that sprue was a specific inflammation of the gastro-intestine, with a definite incubation period, but that the virus was capable of lying latent in the human body for a very considerable period—a period of sometimes 8–25 years. His indications for treatment were the same as Dr. Fairley's, and were based upon the principle of complete alimentary rest until such time as absorption through the small intestine had increased combined with renewed secretion of the succus entericus. His treatment consisted of partly milk and partly high protein dietary, with the exclusion, as far as possible, of a high fat and carbohydrate content. His experience, looking back over ten years, had been fairly satisfactory.

Dr. G. M. HARSTON referred to the favourable effects of heliotherapy in sprue which he had seen in Hong-Kong, and which corroborated the experience of Dr. Manson-Bahr and Dr. Fairley at the Hospital for Tropical Diseases.

Dr. G. W. GOODHART suggested that there was a great difference between the nutrition of the skin in sprue and in pernicious anænia. Another essential difference was the almost immediate and striking increase in body-weight in pernicious anæmia on a protein dietary, whereas a similar rapid increase did not occur in sprue on a high protein non-residue diet.

The PRESIDENT, on the strength of 30 years' experience of treating sprue, made critical comments on the lasting value of the various forms of treatment advocated during that period.

## ROYAL SOCIETY OF MEDICINE.

### SECTION OF OTOLOGY.

THE summer meeting of this Section was held at Nottingham on June 27th and 28th, with Mr. W. M. MOLLISON, the President, in the chair.

A paper on disturbances of hearing in

### The Adenoid Child

was read by Prof. GUIDO GUIDA, who said that at the first sign of deafness in a child specialist advice should be secured, for at this early stage it would usually be possible to avoid lasting disability. In various provinces of Italy a Government inquiry showed that from 10 to 50 per cent. of the children with adenoids had defective hearing. There were also cases in which adenoids were associated with a subnormal mentality. The Italian Government had instructed provincial authorities to organise special agencies against "adenoidism," and these were supposed to coöperate with existing hospitals and clinics. Cases detected in schools were sent to the proper place. Prophylaxis was first carried out for some days in the form of inhalations of calcium or iodine. It was very necessary that frequent examinations of the patient's hearing should also be made.

The PRESIDENT said the profession in this country did not claim to have yet discovered the reason why children had enlarged tonsils and adenoids. He would like to know more about the effects of the prophylactic use of calcium and iodine.

Mr. SYDNEY SCOTT was glad that the Italian Government insisted that these operations should be done only by specialists. Too often in the less populous parts of this country medical men with little or no special qualification for the work had been appointed to clinics.

Mr. H. BELL TAWSE alluded to the investigation made during the last five or six years by a committee of the Board of Education. So far most of the inquiry had concerned children of school age, and had yielded little positive result. It was clearly necessary to go back to the years before school age. In the next few years that committee would issue a further report. An 18 months' trial of bicarbonate of soda for a time before the operation—grs. 10—had resulted in much less post-operative bleeding than formerly.

Mr. L. GRAHAM BROWN said that before the war children were usually brought for operation at 14 to 16 years of age, whereas now the majority brought were between the ages of 4 and 6. This, he thought, showed that the authorities were becoming increasingly appreciative of the close relation between adenoids and deafness. It was very important nationally that adenoids should be recognised and treated early. However young the child, if symptoms pointed to the need, the operation should be carried out. He had noticed that many children sent back for a repetition of the adenoid operation had nothing more than nasal catarrh; medical officers hastily assumed that the condition was adenoids without adequate examination. Some of these children had maxillary sinus suppuration.

Mr. HAMBLEN THOMAS said the London County Council were endeavouring to ascertain the cause of adenoids. Attempts had been made to continue the examination of the children over a period of five years, but towards the end of that time so many failed to appear that convincing statistics could not be compiled. The dietetic factor was important. Children should be examined before school age, for often the damage had been done by the fifth year.

Dr. A. LOWNDES YATES pointed out that it was not until the fifth year that the permanent teeth passed into their adult position, the antrum was enlarged, the ethmoids began to increase, and the middle turbinal came into the nasal airway. Adenoids should not be removed at a very early age, for they had a definite function in removing dust and micro-organisms before the more adult mechanism was fully established. He had noted that when children were exposed to a highly infective environment—as when the mother had much pyorrhœa or ozæna—they formed adenoids early. But if the mother's infective condition was cleared up, the child's adenoids also got well. Excess of lymphoid tissue in these children thus seemed to be a result of sepsis, doubtless coupled with wrong food and other errors. Investigation along these lines would probably be fruitful.

Mr. W. S. THACKER NEVILLE remarked on the lack of provision in this country for the mass examination of school-children for deafness.

Mr. HUGH E. JONES said that many children were sent by school authorities for operation for tonsils and adenoids who did not need it. In most cases the reason was that the children were not examined by experts, nor even by medical people, but merely by a mistress or assistant master. Examination of school-children should be carried out by competent people. He advocated for use on children a much smaller guillotine than was usually employed. Children of 1½ to 2 years should not be subjected to the adenoid operation unless there was obvious interference with breathing.

Mr. T. B. LAYTON agreed with Dr. Lowndes Yates in looking upon adenoid tissue as a physiological structure to be conserved in early life. Adenoids, he thought, were pathological only when they obstructed either the posterior nares or the Eustachian tube, or both. He was carrying out two kinds of operation, according to whether the indication was nasal or aural. If the latter, he removed the lymphoid tissue round the Eustachian tube, leaving the tissue in the mid-line. The child living under bad conditions needed all its lymphoid tissue to combat infection; hence those living in dense slums should not be subjected to the operation. He inquired of parents how many rooms they occupied, and if overcrowding was indicated he did not operate; and so far he had seen no reason to regret that policy.

Mr. HAROLD KISCH said that he had been for a time in contact with a European colony in India, living at an altitude of 5000 feet, and though the children were well looked after, and had enough good food with milk, they had enormous tonsils and adenoids. He operated on all of them. He was sure tonsils were sometimes a definite focus of infection; on at least two occasions he had removed a pad of adenoids with an abscess inside, and he had seen glandular masses elsewhere disappear after adenoids had been removed. When adenoid operations had been done for deafness, the children should be kept under observation, and inflation should be done.

Mr. C. A. RIDOUT said that in many cases of supposed sinus infection after recurrent adenoids the condition was nothing more than nasal sepsis. That was another reason why these operations should be done by competent laryngologists, otherwise many cases of sinusitis would be missed. In some cases the trouble would disappear spontaneously with the development of the sinuses.

Mr. F. W. WATKYN-THOMAS said that in a number of cases of so-called recurrent adenoids there could be seen a felted mass of mucosa extending from one pillar to the other, the whole condition being obviously associated with nasal sepsis.

Prof. GUIDA, in reply, said it was the custom in Italy to test the hearing of school-children, and sometimes before operation they were sent to have inhalations of 5 per cent. chlorine and chloride of calcium. Iodine was also used in the form of iodine-charged waters, or many children seated in a room could inhale iodine-charged vapour from a kettle. Ten per cent. were cured of their deafness by the adenoid operation. Children were not operated upon in Italy younger than 3. The hearing tests were carried out separately on each child, not en masse.

Dr. A. LOWNDES YATES read a paper on

## Repair in the Middle Ear.

Five years ago, he said, when he was interested in the repair of nasal and of aural epithelia he found that in certain cases although repair of the epithelium took place apparently the hearing did not become normal. He therefore carried out experiments to ascertain the relation between the healing process and the restoration of the middle-ear function. Working on a model of the middle ear, in which a microphone connected with a loud speaker was fitted in place of the cochlea, he found that in the artificial middle ear there were three primary positions of the ossicles: (1) a position of rest, in which only penetrating or loud sounds were heard; (2) a position of listening, in which the ossicles lay in a position in which there was maximal hearing of all notes; (3) a position in which the membrane was indrawn, similar to that at the summit of a wave of sound when it fell on the membrane. This last position he characterised as that of "having heard." Thus deafness might result either from maintaining the position of rest or that of "having heard."

If the membrane was indrawn it was the custom to inflate the ear, but in most cases this was not good practice, because the infective products which blocked the tube and caused the vacuum might be blown into the cavity of the middle ear and there cause inflammation. A better plan was to aspirate the mucus from the interior of the Eustachian tube by the catheter designed by Weber and Liel. Cerumen was secreted in a very fluid form and ran over the tympanic membrane, thus oiling it and preventing the evaporation which perhaps occurred from the mucus present in the middle ear. It seemed clear that evaporation could occur through the tympanic membrane, and in mild conditions of inflammation repair might thus be hindered. In subacute otitis media the membrane was sometimes pushed out by mucus lying between it and the inner tympanic wall. This mucus was removed at intervals by the action of the cilia. In these cases there was pain and, later, a partial deafness which increased in degree, and the alterations in hearing were similar to those by which otosclerosis was diagnosed.

If the view was accepted that listening was, in part, the result of the contraction of the tensor tympani which brought the cog processes of the malleus and the incus into contact, then repair within the middle ear might be complete, but leave the structures in a position which made listening difficult. In many of the cases which showed a high degree of auditory fatigue there was evidence of a lesion of the perceptive mechanism. In some in which such was not the case it was found that the patients had no power of resting their ears, and the mechanism of the middle ear was retained in the position of listening.

Dr. Yates described his experiments on the character and action of mucus, and said that repair within the middle ear seemed to depend on the interplay of two mechanisms: that concerned with the removal of the mucus by the ciliated epithelium, and that concerned with destruction of the agents causing infection. When mucus contained leucocytes and such organisms as the *Staphylococcus aureus*, desquamation was not great, and the ciliated epithelium began to act again quickly after the inflammation subsided. When, however, the cells visible in the mucus represented desquamated epithelium, repair was much slower. The proteolytic ferments elaborated by the micro-organisms were the most important element in the prevention of repair in the leucocytic type of inflammation; it was, indeed, these ferments which caused the perforation of the membrane.

Otosclerosis was a condition of the labyrinthine capsule, and so was a state which could not be recognised until the ear was examined post mortem. Otology would be much helped if the term "otosclerosis" were dropped and research were centred round the desquamative types of inflammation, which produced symptoms indistinguishable from those said to be present as a result of the lesions of the labyrinthine capsule. His treatment of these cases had been successful only in the early stages; it was to carry out repeated aspiration of the Eustachian tube, combined, where necessary, with myringotomy. If the membrane was pushed out in minor states of inflammation, a type of deafness resulted which had been described as an inability to listen. If this was present during the active stage of inflammation, myringotomy would relieve the tension, and the need for this must be diagnosed by the results of the hearing tests. In every state of inflammation of the middle ear the repair might be prevented by conditions which affect the general health.

The speaker submitted the following conclusions:—

(1) When repair occurs within the middle ear it does so because of the activity of the bactericidal action of the mucus and of the cilia which move the mucus on. The state of repair of this region can be assessed to some extent by the discharges which lie within the tube or which escape through the perforation in the tympanic membrane. It is important to recognise the two main types of inflammation in the ear—the eucocytic and the serous—and to try to treat each in the appropriate way.

(2) Most of the lesions causing deafness arise as a result of inflammation in the middle ear; and the two primary positions in which the normal ear hear with diminished acuity are that of "having heard" and the position of "rest." The two common forms of deafness may be due to the auditory mechanism becoming fixed in these positions, while fixation may occur in the position of listening which make it impossible to rest the ear.

A discussion followed.

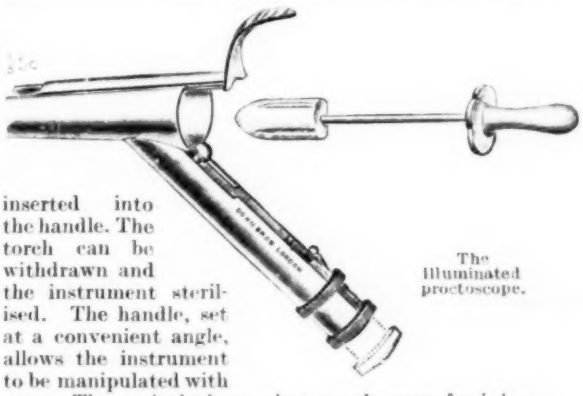
### OTHER COMMUNICATIONS.

The meeting then considered the preliminary report of the committee appointed by the Section to inquire into hearing tests.—Dr. H. MUIR EVANS read a paper, supported by numerous slides and some specimens, on the Swim Bladders of Fishes and Weberian Ossicles, and Dr. YATES gave a demonstration of sound records, explaining the principles of the talkie machine.—On Saturday a series of clinical cases were shown, and the remaining items consisted largely of demonstrations, among them one on the galvanic method of testing the auditory apparatus.—Mr. G. WILKINSON spoke on some mechanical problems in the construction of cochlear models.

## NEW INVENTIONS

### AN ILLUMINATED PROCTOSCOPE.

THE proctoscope here illustrated has been designed specially to meet the requirements in the modern treatment of hæmorrhoids by injections. The illumination is obtained by a standard pocket torch inserted into the handle. The torch can be withdrawn and the instrument sterilised. The handle, set at a convenient angle, allows the instrument to be manipulated with ease. The conical shape gives ample room for injections to be made whilst the mucous membrane remains under observation. As a rule injections are made with the slide in position. The instrument can then be rotated without reinserting the obturator. The site of the injection can be accurately determined by withdrawing the lateral slide. The instrument is equally useful in routine rectal examinations and in minor rectal surgery. For use in operative work a similar instrument on a slightly larger scale is more useful.



The illuminated proctoscope.

This proctoscope has been made by Messrs. Down Bros., Ltd., St. Thomas's-street, London, S.E.

PETER G. MCEVEDY. F.R.C.S. Eng.

# REVIEWS AND NOTICES OF BOOKS

## Tropical Medicine.

By Sir LEONARD ROGERS, C.I.E., M.D., F.R.S., Major-General, I.M.S. (Ret.), Medical Adviser to the India Office; and JOHN W. D. MEGAW, C.I.E., M.B., Director-General, I.M.S. Churchill's Empire Series. London: J. and A. Churchill. 1930. Pp. 536. 14*s*.

THE joint authors of this book have contributed in great measure to the advancement of tropical medicine. Many years' experience in clinical and pathological teaching work in India has convinced them of the need for a small book which describes such simple microscopical work as the practitioner in the tropics can carry out himself. The existing works on tropical medicine, they consider, meet the detailed demands of readers anxious to qualify for a diploma rather than those of the practising doctor.

The conception and also the arrangement of the subject matter is novel. Tropical diseases are classified into ten sections, of which the more important are headed: febrile diseases caused by protozoa, febrile diseases caused by spirochætes, febrile diseases of uncertain origin, the typhus fever group, bacterial febrile diseases, bowel diseases with symptoms of diarrhœa and dysentery, diseases associated with diet and those caused by heat and light. This clinical classification is straightforward and easy to follow. Much space is devoted to the history of tropical medicine, and here the teaching differs in some details from that usually given. Some chapters, as Chapter IX. on the typhus group and Chapter XXIV. on climate as a disease factor, deserve especial praise. In the matter of terminology we note that the authors do not follow the modern somewhat kaleidoscopic changes in scientific nomenclature. They retain *spironema* as the generic name for the pathogenic spirochætes, although this term was rejected by Styles years ago on account of fore-stalling, while the terms macrogametocyte and macrogamete are not always used in their strict zoological sense. Although morphological details about the pathogenic parasites are probably unnecessary from the practitioner's point of view, yet their absence leaves little to assist him in gaining an insight into the life-history of the parasites. The illustrations are not much good for this purpose. A simple figure of the structure of *Ancylostoma duodenale* and of such an important parasite as *Filaria bancrofti* would be helpful, for the reader cannot be expected to glean much aid from the two coloured plates of protozoa, bacteria, and helminth eggs stained in various ways, which are so reduced in size as to become difficult to decipher. The same criticism may be levelled at the black and white figures giving in brief the story of a disease. The sections on treatment are satisfactory on the whole, though some of the statements are rather too dogmatic. The authors show but little enthusiasm for certain drugs which have received wide support. For example, plasmoquine in malaria, and Bayer 205 in trypanosomiasis, and yatren in amœbiasis. There is surely no justification for stating that *Filaria bancrofti* has a "diurnal periodicity" (p. 385), or that the Planorbis snail is furnished with an operculum (p. 413). The book is in the main accurate and is full of good material.

## The Adolescent: His Conflicts and Escapes.

By SIDNEY I. SCHWAB, M.D., Professor of Neurology; and BORDEN S. VEEDER, M.D., Professor of Physical Pediatrics, Washington University. London: D. Appleton and Co. Pp. 365. 10*s*. 6*d*.

THE sudden burden that is placed upon the adolescent at puberty has both physical and its mental components. The fructifying of the sexual life has its repercussion upon both body and mind, and it is the ability of the human being to bridge this perilous gap that marks future failure or success in life. Although modern psychology rightly stresses the first five years of life as formative of character, the period of puberty is certainly second in importance. The authors have introduced their subject very naturally by reference to the physical growth and development of the adolescent, but they realise that the psychological mechanisms involved in the process of maturing and of adjusting social life are of paramount importance. They therefore analyse in great detail every aspect in the life of young persons of both sexes at this turning point. They tend to take an environmental view of the conflicts and adjustments, normal and abnormal, which characterise the life of the adolescent. Sex, too, is rather cleverly treated as an environmental factor and not as an internal urge alone. This is a very important point of view, because there is no doubt that the sexuality of young persons is largely coloured by the milieu in which they find themselves. But, on the other hand, while the Freudian theories are discussed, the authors do not give Freud all the credit for having explained the deep significance of some of the conflicts of puberty which can only be superficially understood in terms of immediate problems. Any student of dementia præcox knows that the stress which is alleged to have precipitated the pathological introversion is usually quite inadequate to explain the depths to which the cleavage in the mind usually goes. The result is that in the authors' discussion of personality problems their treatment of this nuclear problem in psychopathology appears too superficial. For those, however, who require a guide to the understanding of the immediate problems of adolescence this book can be cordially recommended.

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## Roentgenographic Technique.

By DARMON ARTELLE RHINEHART, A.M., M.D., Professor of Roentgenology and Applied Anatomy, School of Medicine, University of Arkansas; Roentgenologist to St. Vincent's Infirmary. London: Henry Kimpton. 1930. With 159 illustrations. Pp. 388. 28*s*.

BELIEVING that all books on radiographic technique "are either obsolete or incomplete in some particular," Prof. Rhinehart set to work to write a new manual for physicians, students, and technicians, which should be free from such defects. He has certainly produced a fine and original work. He criticises the usual presentation of radiographic technique for making no provision for differences in the apparatus or equipment at disposal; moreover, it is usually based on a hypothetical patient of certain dimensions. By introducing a series of experiments to determine the operating peculiarities of each machine, by pro-

viding a simple experimental method of gauging the effective output of each equipment, and by basing exposures on the thickness and radiographic density of the parts of the body, he claims to produce a standardising technique, irrespective of the diverse conditions that are met with. In the experiments described, the reader is instructed how to build up charts and graphs suited to his own conditions of work—e.g., a thickness-voltage chart, and considerable use is made of teeth embedded in paraffin blocks to determine the necessary voltage to produce a radiogram of satisfactory quality through various thicknesses, corresponding, of course, to different parts of the body. Everything is worked out so that standardisation can be obtained with such apparatus as is available.

The first half of the book deals with the physical and technical side of radiology, leads up through experiments to "a basic roentgenographic technique," and includes very useful miscellaneous instruction. The second half gives the applied technique for different parts of the body. The final chapters on the urinary tract and on localisation are hardly up to the standard of the rest of the book. When giving instructions on localisation the author might have quoted more fully from the excellent American Army X Ray Manual to which he refers. In the section on the gall-bladder, Prof. Rhinehart strongly advocates the oral administration of the dye. He says: "We have examined several hundred patients by means of cholecystography. A short and stormy experience with the intravenous method prompted its complete abandonment in favor of the oral administration." It is permissible to wonder what tragic story lies behind this statement, for in most centres the oral method had an uphill fight to obtain recognition, and the advocates of the intravenous method held the field for years, in spite of the obvious disadvantages of a minor operation.

The chief value of the book is that it records the practical personal experience and judgment of one who has made himself master of his subject. It will surely be of great value to all students and practitioners of radiology.

## Lehrbuch der klinischen Untersuchungsmethoden für Studierende und praktische Ärzte.

Seventh edition. Von Prof. H. SAHLI. Vol. II. First part. Leipzig and Vienna: Franz Deuticke. 1930. Pp. 368. M.22.

THE present edition of Prof. Sahli's well-known handbook has numerous additions. The new methods introduced are confined to those which have a real value in clinical medicine. The multiplication of biochemical and other methods of investigation in recent years has been excessive, and we welcome the stand that Prof. Sahli has taken in discountenancing technical procedures that inflict discomfort or even danger to the patient out of all proportion to the value of the results produced. The abundance of alternative methods may so encumber medical diagnosis that essential points may be overlooked. The choice from such alternatives must be a matter of scientific knowledge and not of intuition, which, as Prof. Sahli remarks, is based upon hard work and observation, and is not an "art" inherent in some and lacking in others. Of those methods which he regards as really helpful and advantageous to a patient he gives a full and practical account. This volume deals with methods of examination of the urine, sputum, and blood, and provides detailed descriptions of technique as well as critical considerations of the results obtained.

New matter includes tests of renal and liver function, vital staining of the red cells, and discussions on the leukæmias and on gout. Throughout the work there is an emphasis upon fundamentals for which all Prof. Sahli's work is famous.

## Minor Surgery.

Second edition. By ARTHUR E. HERTZLER, M.D., Chief Surgeon, Halstead Hospital; and VICTOR E. CHESKY, M.D., Chief Resident Surgeon to the Hospital. London: Henry Kimpton. 1930. Pp. 602. 42*s*.

THE avowed object of this book is to help what is termed the "dispensary student" to understand what he sees in the out-patient clinic. With this object in view discussions on pathology are omitted, and treatment is mostly referred to only in general terms, detailed technique being given where the authors have a particular method of their own. In so far as the book is magnificently illustrated, while typical lesions are clearly reproduced, it admirably fulfils its object. The authors' clinical material must be extensive and it has been utilised to fullest advantage. We have all sat as students in out-patient departments waiting to see and examine "lumps," and everything that could come into that category is here illustrated and described. If the student working in the out-patient department wants to read about a lesion in all its aspects he will be disappointed in this book, where he will find merely a brief account of the condition as it is seen clinically, and a scanty outline of its treatment and prognosis. But if he seeks description and illustration of the early picture of any disease of which he has seen an advanced stage he may find here exactly what he wants.

## Slit-lamp Microscopy of the Living Eye.

Second edition. By Dr. F. ED. KOBY (Basle). Translated by CHARLES GOULDEN, O.B.E., F.R.C.S., Surgeon to the Royal Ophthalmic (Moorfields) Hospital; and CLARA LOMAS HARRIS, M.B. London: J. and A. Churchill. 1930. With 104 illustrations. Pp. 360. 15*s*.

ON its introduction the slit-lamp was regarded by many ophthalmic surgeons as little better than a toy, as far as its practical applications are concerned. Further experience tends to refute this opinion, and it must now be admitted that ability to use and interpret the slit-lamp is essential to the complete training of the ophthalmic surgeon of the future. This means that the student must devote some time to acquiring familiarity with the technique, and for this he will need an efficient teacher and a good book. In the periodical courses of instruction that are given at Moorfields Hospital this translation of Prof. Koby's book is used as a text-book. Koby's expressions are sometimes unnecessarily mathematical. For example, the convenient name given by Harrison Butler to the portion of the cornea illuminated by the narrow slit is "corneal prism," though it is admittedly not a prism in the ordinary sense. Koby calls it a "parallelopiped." It is, of course, only the anterior parts of the globe that are accessible to examination by the corneal microscope. With the

aid of the illumination provided by the slit-lamp it is now possible to detect minutiæ in either the normal or the pathological structure of the cornea, anterior chamber, iris, lens, and anterior part of the vitreous. The chief practical applications, that have so far been made, relate to corneal opacities, their depth and nature, the structure of the lens and the various varieties of cataract, changes in the structure of the iris, and the detection of particles in the aqueous humour, and of slight degrees of precipitation in Descemet's membrane. The most definite result to date of slit-lamp illumination is the discovery of various zones of discontinuity in the substance of the lens which have led to an entirely new nomenclature describing its structure, these being now distinguished from within outwards as embryonic nucleus, fœtal nucleus, adult nucleus, and cortex.

## Diseases of the Blood.

By PAUL W. CLOUGH, M.D., Associate in Clinical Medicine, Johns Hopkins University. London: A. and C. Black, Ltd. 1930. Pp. 310. 6s.

In the exposition of any given subject there are those whose aim appears to be to render the simple as complex as possible; there are others who have the gift of rendering the relatively complex simple. The study of hæmatology has always attracted an unfortunately large proportion of the former class. Dr. Clough has the gift of clear exposition and knows how to avoid unessentials; what is more, he has the rare power of mastering and of applying general principles. This little work of only just over 300 pages contains more useful and well-arranged material than many more pretentious volumes of three times its size and six times its cost. On his first page the author takes care to point out that there is no such thing as a "disease of the blood;" he then sets forth concisely all that is known about the conditions usually considered under that head. Throughout the information is up to date and accurate. The book is not overloaded with illustrations, but such plates as are provided are excellent. It is refreshing to read a book on the blood in which it is neither assumed nor stated that 5,000,000 per c.mm. constitutes a divinely ordained normal for the red cells; in which it is made clear that there is no consensus of opinion as to what constitutes 100 per cent. of hæmoglobin; that the volume index is of even greater importance than the colour-index in the diagnosis of pernicious anæmia; and that nothing is to be gained by attempting to differentiate beween "large" and "small" lymphocytes or between monocytes and "transitional" cells. This will be a good book for students when examiners are educated up to its standard.

## La rachianesthésie: sa valeur et sa place actuelle dans la pratique.

By E. FORQUE and A. BASSET. Paris: Masson et Cie. 1930. Pp. 222. Fr.30.

Prof. Forque and Prof. Basset have produced a comprehensive and judicial account of spinal analgesia. Unfortunately, the most recent developments in this line, spinocain "controllable anæsthesia" and percain, are not mentioned; probably neither of them had been made known while the book was being written. A large part of the work is devoted to physiological considerations, for the authors maintain that it is only on our full knowledge and understanding of the physiology of the cerebro-spinal fluid and of the spinal nerves that proper practice can be founded. They attribute the wide variations in technique to the fact that there is no clearly laid down and generally accepted account of the physiological problems involved. This account they declare themselves anxious to provide, and they certainly go far towards achieving this aim. Their views and practice are, generally speaking, strictly orthodox. They do not approve of high anæsthesia, reducing the use of spinal anæsthetics generally to operations below the umbilicus. They disapprove of barbotage, and they recommend fine needles and slow injection. They depend on amount injected and force of injection for the degree of anæsthesia to be obtained. The interesting and novel suggestion is made that perhaps in the last analysis the phenomena of spinal analgesia will all be explained on an electrical basis. The vomiting, which is not uncommon some 20 minutes after injection, these authors attribute to action of the injected drug on the vomiting centre, an opinion contrary to that generally advanced in this country. Their routine drug is novocain, which they use generally in an 8 per cent. solution, and inject preferably in the fourth lumbar space. The book is written with lucidity, and any anæsthetist should read it with pleasure and advantage.

# REPORTS AND ANALYSES

## SOYOLK.

(THE SOYA FLOUR MANUFACTURING CO., LTD., 7, MINCING-LANE, LONDON.)

"SOYOLK" is a pale yellow, very finely ground flour, prepared from the Soya bean by the Berczeller process (Eng. Pat. 234,202 of 1924), the beans being first heated in a dry state, then agitated and subjected to the action of low pressure steam. This amounts to a partial cooking process, and the resulting flour, whilst retaining the high nutritive value of the original beans, loses the characteristic rather harsh raw flavour.

When analysed the following results were obtained:

| | | |
|---|---|---|
| Moisture | 7·3 | per cent. |
| Fat | 20·0 | ,, |
| Protein | 43·5 | ,, |
| Mineral salts | 4·7 | ,, |
| Phosphoric acid | 1·44 | ,, |
| Lecithin phosphoric acid | 0·16 | ,, |
| Fibre | 1·38 | ,, |
| Cane sugar | 10·50 | ,, |
| Other carbohydrates | 10·10 | ,, |

The nutritive value of "Soyolk" is very high, the conventional calorie value being 449 per 100 g., whilst that of a wheat flour is 360; nearly nine-tenths of the protein in "Soyolk" is soluble in pepsin hydrochloric acid.

The Soya bean is a well-known food material in the far East, and its introduction to the Western hemisphere is a useful addition to our food-supply. Hitherto the principal objection has been the rather unpleasant flavour, but this appears to have been eliminated in "Soyolk." It is interesting to note that some authorities claim that the protein in the Soya bean is one of the few vegetable proteins which, to a great extent, are capable of substituting meat proteins.

# THE LANCET.

*LONDON: SATURDAY, JULY 5, 1930.*


## DISINFECTION.

THE first volume of the Medical Research Council's "System of Bacteriology" is of more general interest than the four highly technical instalments which have actually been published before it. Prof. W. BULLOCH deals with the history of bacteriology with his usual accomplished mastery of the literature. Prof. F. W. ANDREWES, discusses the classification of bacteria and the criteria which give valid distinctions between genera and species, and Dr. J. A. ARKWRIGHT writes an extraordinarily interesting account of bacterial variation. Both these articles have wide biological implications, and we hope they will be read by many scientific workers who have no immediate connexion with microbiology. The same is true of the article by Miss HARRIETTE CHICK, D.Sc., on the theory of disinfection, which not only indicates how practical people may use disinfectants to the best advantage, but opens up the great problem of how animals are killed by harmful conditions of the environment, in other words, the principles of mass destruction through which natural selection operates. We wonder whether these products of the bacteriological laboratory are as familiar to general biologists as they ought to be. Miss CHICK points out that, when a disinfectant is applied to a large population of bacteria, the microbes are not all killed at once. The killing process takes time, even if that time is very short, and if the disinfectant is strong enough to kill the great majority in a minute or two it will hardly succeed in killing all of them in half an hour. If the killing time is reduced by increasing the strength of the disinfectant, or by raising the temperature at which it acts, the same relation holds; some microbes still survive much longer than the majority. Incidentally, we suspect that the influence of high temperatures in increasing the efficacy of disinfectants is hardly sufficiently realised except perhaps by those who insist on having hot water to wash their hands with; the killing effect of carbolic acid is enhanced about ten times by a rise of 10° C., and soap, at the hottest temperature which the average hand can bear (a little below 50° C.), is probably three or four times as fatal to micro-organisms as it is at body temperature. The killing being in all cases a time process, it cannot be as correct as it is convenient to talk of this or that organism having a certain "thermal death point"; all that is really ascertained is that at a given temperature, &c., a certain proportion—e.g., 90 per cent.—of the individuals are dead at the end of a certain time.

So much for the immediate practical applications. The more detailed analysis of this time process takes us into the fundamentals of life. It is found (and Miss CHICK herself has been mainly responsible for the discovery) that the individuals in a uniform population of bacteria die logarithmically, which is to say that if 50 per cent. die in the first minute of disinfection, 25 per cent. will die in the second minute, 12½ per cent. in the third minute, and so on; the number which die in any interval of time is always a constant proportion of those alive at the beginning of the interval. The extraordinary thing is that this is just the way in which molecules of cane sugar break up when they are boiled with hydrochloric acid, with the implication that the whole of the microbe is analogous to a molecule. Prof. A. E. BOYCOTT commented some time ago on the significance of this analogy in our conception of the units of which the world is made. It may be—the suggestion was made too recently to be incorporated in the article—that the death of the organism is determined by the destruction of some one particular molecule. This would, perhaps, make the analogy easier to accept, but it would leave the explanation of the facts where it is, since physical chemists can "explain" the behaviour of the cane sugar molecules only by assuming that they are subject to rhythmical changes in susceptibility to hydrochloric acid. This logarithmic process of death is also flatly discordant with the general rule that all measurable qualities of live organisms are distributed on something like the normal curve of variation. If resistance to disinfectants varies on the same plan as human stature or the diameters of blood corpuscles, there should be a few very susceptible organisms and a few exceptionally resistant, with the majority in intermediate positions. Killing off a population like this does not give a logarithmic curve, but one in which the rate of disinfection increases as the process proceeds. And it is necessary to note that though the logarithmic result has been obtained in a majority of the most careful observations, a result compatible with the normal curve of resistance has been reached several times. The logarithmic death-rate is, therefore, not an invariable rule, and Dr. HENDERSON SMITH has published figures which indicate that the mode may vary with the strength of the disinfectant.

The matter is puzzling enough, and Prof. C. EIJKMAN made it more curious when he discovered that bacterial spores germinate in the same logarithmic fashion. But there is no doubt about the fundamental importance of the problem, and the more people puzzle about it the better. They cannot do better than start with Miss CHICK's summary account.

## THE I.M.S. AND THE SIMON REPORT.

IT is chiefly through the medium of the Indian Medical Service, which still contains a large British element, that this country has come into touch with medical affairs in India, and the future of that service is a matter of concern not only to those who are serving and those who contemplate

entering the service, but to all who are following the progress of medicine in the East. Doubtful or undesirable conditions of service would lead to an increase in early retirement, and to an accentuation of the shortage in recruiting which is already pronounced enough to give cause for anxiety. The proposals contained in the report of the Indian Statutory Commission are, as has been emphasised by Sir JOHN SIMON, merely recommendations: but even should they not be adopted, they cannot fail to influence future developments, for good or for ill. The most explicit reference in the report to the Indian Medical Service deals with the provision of European medical officers for the medical treatment of European members of the services in general and their families. This consideration has been repeatedly stressed by previous commissions, and the present report insists that no efforts should be spared to secure an adequate number of suitable recruits for the purpose. In other directions there have been many proposals during the last 40 years for the reorganisation of the Indian Medical Service: some of them have contemplated a separation of the civil branch of the service from the military, others a decentralisation of the civil side and the substitution of provincial services. Logically there was much to be said for several of these schemes, but the fact remains that all of them have so far been rejected on account of obstacles, insignificant enough in appearance, but apparently insuperable.

The crux of the problem at the moment, and the consideration which is most likely to affect recruiting, is the question whether the remaining civil appointments are to be dealt with on a central basis, in association with the military branch, or whether they are to be provincialised. On this the report sheds some light, if only indirectly. The Commission recommends that the Secretary of State should still retain power to prescribe the number of I.M.S. officers to be employed in the provinces, as well as the appointments and conditions upon which they shall be employed. This would seem to imply continuance on an all-India footing: and indeed many of the contentions in favour of all-India recruitment for the so-called security services, which include the civil service and the police, as well as for irrigation and forestry, would equally apply to medicine. It is argued with justice that an imperial service appeals to a large circle of candidates, while the status and tradition attaching to it draws recruits of a superior class. The recommendation of the Lee Commission that medical officers recruited on an all-India basis should continue to be employed in the provinces to maintain a war reserve is also cited, apparently with approval: it is pointed out that if European recruitment for irrigation, for example, were conducted on provincial lines, it would probably be on short-time contracts, involving risk, from an administrative point of view, that would be hard to justify. Precisely the same would apply to the I.M.S. It has been suggested that provincial ministers might be hampered in carrying out their duties by the limitations upon their control over members of the all-India services. In practice this has not been so. Evidence was given by these ministers before the Lee Commission that, with negligible exceptions, all-India officers serving under them had given their loyal support. No doubt the converse for the most part holds good, although there is an unfortunate impression in certain provinces that ministers in transferred departments (of which medicine is one) are apt to interfere unduly in detail. This tendency would certainly not be diminished by provincialisation.

If the right kind of recruit is to be attracted to medical service in India it is at the present juncture more than ever necessary to avoid any action which would tend to neutralise the improvements in the terms of service which have been lately introduced. Among other things these include, as our readers are aware, passage concessions, overseas pay, and reservation of certain posts. As regards existing members of all-India services, including the medical, the Commission appears to have done all that was in their power to safeguard their position. No change is to be made to their disadvantage, and they are to be entitled to any concessions that may be granted in future. A proviso is also made that retirement on proportionate pension should remain open without limit of time to any officer who might under the present rules have so retired upon the coming into force of the constitutional changes now proposed. It is recommended too that any changes in the statutory rules which concern officers now in the all-India services should only take place with the consent of a majority of the Council of India, which would, as hitherto, contain representatives of the services. There are in the report some apposite observations about the safeguarding of service pensions. It is regarded as certain that European recruits of the required capacity and character required can only be obtained on terms which give them—subject to one exception—the same rights, privileges, and safeguards as have been awarded to the present members of the services. The exception is the right of premature retirement, and it is an important omission. The difficulty is partly met, however, in the case of the I.M.S. by the system of optional retirement, with gratuities, after a certain number of years. If the assumption on which these observations are based is justified, it would appear that the I.M.S. has little to fear from the recommendations of the Commission. It is true that with progressive Indianisation the European personnel in all departments is likely to shrink still further, but for the present at all events the medical service is less likely than any other to be affected, and most other adverse influences have been discounted in advance. Few would be bold enough to forecast what political and other changes the next few months may hold for India, but so far as medicine in its official capacity is concerned the portents seem no worse now than they were a fortnight ago. There are so many Indians now in the service that the racial aspects, from which it has been so acutely surveyed in the past, will no longer afford the logical method of thinking—the service as a whole and not its racial make-up has to be regarded.

## GLANDULAR FEVER.

THOUGH not a rare disease, glandular fever is often overlooked. At present it seems to be pretty widespread in this country, and though the cases mostly conform to type, there are several variations which may darken judgment. As first described by PFEIFFER, in 1889, it is an epidemic infection, tending to affect children and young adults, and its characteristic features are pyrexia, enlargement of lymphatic glands, and slight constitutional disturbance. H. LETHEBY TIDY and E. C. DANIEL, reviewing the subject in our columns[1] a few years ago, said that as a rule the onset is acute with malaise and fever, and that the temperature, though it may rise to 103° F. or higher, is usually in the neighbourhood of 100°. The glands commonly begin to enlarge within the first week, often at the third or fourth day, but in the present epidemic there has sometimes been no swelling until the fourteenth day, or even much later. The cervical and occipital glands are most likely to suffer, and they may be greatly swollen and tender on palpation. The enlargement, like the fever, may last many weeks, but usually the symptoms subside within a month. Many of the contemporary cases are running a long course, and often either the fever or the glandular swelling is relatively slight. A rash has been noticed in a fairly large proportion, and some have been recorded at first as examples of "an obscure exanthem."[2] In our present issue Dr. MAITLAND RADFORD and Dr. J. D. ROLLESTON describe two cases in which the rash resembled that of typhus. Apparently it is apt to appear in crops between the fourth and tenth days of the illness, and it may simulate the rose spots of typhoid. GEOFFREY EVANS and W. A. ROBB[3] have observed urticarial, macular, and papular eruptions, but while all these may lead to mistaken diagnosis it cannot be said that any rash at all is characteristic of the disease.

Lymphocytosis and splenomegaly are neither of them quite constant features of glandular fever, but a certain amount of enlargement of the spleen is usual, and there is nearly always an increase of lymphocytes in the blood, both absolute and relative. The total number of white cells is commonly about 10,000, but may rise as high as 25,000, and the bulk of them are large mononuclears with big pale nuclei and large amounts of protoplasm. There is no anæmia. The blood picture may thus be exactly the same as in the condition described as infective mononucleosis by SPRUNT and EVANS,[4] and variously recorded as pseudoleukæmia or as "acute lymphatic leukæmia with recovery" by older observers. The two diseases—glandular fever and infective mononucleosis—are now regarded as identical. The lymphocytosis is, of course, an important diagnostic guide, and the main points to look for are thus: (1) fever with little constitutional disturbance; (2) enlarged and tender glands, often with a palpable spleen; (3) lymphocytosis without anæmia; and (4) occasionally an indefinite rash. Tonsillitis is absent, though the fauces may be reddened, and the parotid is not involved. In an epidemic these features make the diagnosis relatively simple, but this is by no means true of isolated cases. The greatest difficulty lies in differentiating the condition from a "pyrexia of unknown origin" and from the typhoid and paratyphoid group of infections. In the latter the absence of lymphocytosis, a positive blood culture or Widal reaction, and a much greater constitutional disturbance may serve to make the distinction. In rubella there is no splenic enlargement, the glandular swelling is transitory, and the rash is immediate, whilst mumps, and septic glands due to tonsillitis and the like, should be readily identifiable. Glandular fever is unlike leukæmia in that it does not cause the same degree of illness and there is no anæmia. The glands may feel like those of Hodgkin's disease, but are nearly always tender; they are never known to suppurate like septic glands or caseate like tuberculous glands.

Of the ætiology of glandular fever little is definitely known. The disease is unquestionably epidemic, but is not very contagious, and patients can be safely nursed in a general ward. Spread in schools and institutions is more probably attributable to a common source of the infection than to direct contagion. The incubation period has been placed at between five to seven days, but is now thought to be considerably longer, and may well be four or five weeks. The only common sequela is a period of depression—similar to that which follows influenza. Nephritis has been mentioned as a complication, but is always unusual and is extremely rare in the present epidemic. The treatment is purely symptomatic.

[1] THE LANCET, 1923, ii., 9.
[2] Brit. Med. Jour., May 24th, p. 976; June 28th, p. 1179.
[3] Ibid., June 7th, p. 1039. [4] Quoted by Tidy and Daniel.

## THE BREEDING OF MAN.

THE opening took place this week of the Animal Breeding Research Department in the University of Edinburgh, the formal declaration being made by Sir EDWARD SHARPEY-SCHAFER, emeritus professor of physiology in the University. Sir EDWARD in his address took for his text the words appropriately placed by Prof. CREW, the Director, over the entrance: "To the Advancement of Science and the Service of Mankind"; he eloquently outlined the position in which scientific genetics now stand, while with grave but amusing malice he ruled the opponents of physiological research out of any court where reason may be the judge or humanity the jury.

The department was established ten years ago, with the function to investigate the principles governing the breeding of animals employed in agriculture, but, Sir EDWARD pointed out, though primarily the encouragement of agriculture under the auspices of the relevant Government bureau had been the objective, the far-sighted view had been adopted of applying the lessons to be learned from the breeding of animals, small and large, and of plants, to the betterment of man's pedigree; while he pointed out that the direction of such studies could have fallen into no better hands than those of Prof. CREW, an opinion that will be

endorsed by all who are familiar with the Professor's text-books, or have personal knowledge of his learned enthusiasm. Sir EDWARD'S main thesis was that the principles of genetics, as we now begin to understand them, are found applicable to all animals and to all plants; the lessons derived from their study can be applied to man, so that knowledge acquired in the breeding of the horse, the fly, or the sweet-pea can be, and should be, utilised for the improvement of the human race, with the outcome that much which tends to depress that race, physically and mentally, may be eliminated. Deliberately passing over the question of birth control, he pointed to the dependence of the study of animal genetics upon physiology and biochemistry, and proceeded to explain in a vivid manner to a general audience the part played in the production of sex-characteristics by specific chemical substances circulating in the body. His main example of such influence was that of the pituitary body whose physiological activity he described as a romantic interlude, comparable, though scientifically true, to the adventure in "Alice in Wonderland," where the heroine grows larger or smaller in accordance with a definite vegetable dosage.

Civilisation cannot, at any rate yet, envisage organised endeavours to promote amelioration of the race by breeding from the highest types, while the study of eugenics reveals to us the grave risk that inferior stock may impede progress by its comparative prolificity. Meanwhile the problems, whose existence is thus implied, grow more complicated. For this reason, the hard work, with its large outlook, that is now being carried on at Edinburgh, deserves the attentive approbation of all. The breeding of man is not necessarily declared to be a mere matter of physiology, because we can see that in such physiological research as Prof. CREW and his staff are carrying on there lies a great possibility of increasing the happiness of the world. Although man may be more than an animal, there is every reason why his plight as an animal should be improved. Certain it is that any other qualities in his make-up will share in the story of development.

# ANNOTATIONS

## CRIME.

THE newly issued Criminal Statistics [1] for the year 1928 teach, among other lessons, the heavy price which the community has to pay for the lunatic at large. Out of 909 criminal lunatics under detention at the end of the year, no fewer than 405 had been charged with murder. In 1928 there were 56 persons arrested for the murder of victims aged 1 year and over; 9 of these 56 were found insane on arraignment (i.e., unfit to plead), and 11 were found "guilty but insane." The need of earlier diagnosis and earlier treatment is an obvious inference. Out of a total of 150 criminal lunatics received into asylums during the year in question, 54 had been found by juries to be either insane on arraignment or "guilty but insane"; only five of the remaining 96 had been certified insane before trial; 91 were certified insane while serving sentences in prison. It is hard to resist the impression that there was waste of time and money in trying persons who were already insane. The criminal law really ought to enlarge its ancient view of responsibility for crime. It should learn to recognise mental disease as a condition of perhaps long and gradual development rather than to contemplate only the sudden aspect of 100 per cent. insanity. Is it reasonable to suppose that the insanity of those 91 persons was not to be detected without first sending them to prison as convicts? After giving a comparative table of figures for 1911 and 1928 to show the sentences passed for indictable and non-indictable offences where delinquency was associated with mental impairment, the report observes that there were also many cases where, because the condition had not been diagnosed, or for other reasons, the certifiable mental impairment did not appear until the person had been sentenced. "In some of these cases the persons were removed to asylums as criminal lunatics; in others to institutions for mental defectives; but the shortage of accommodation for the latter often caused delay. If more accommodation was available and was utilised at the outset, fewer mentally deficient persons would commit offences, come before the courts, and raise the vexed question of sterilisation." This is a shocking admission by the department responsible.

The general tenor of the introduction to the statistical tables is of great interest. The Home Office, if it has to disclose increased figures for certain crimes, naturally does not want us to think that the police, the magistrates, the law-courts, or the administration are failing in their duty. Thus we are warned against fluctuations which may be purely statistical. Are more crimes reported? It may be because the police are becoming more vigilant, or because victims more willingly come forward, or because the popularity of insurance leads to more frequent complaints of loss or damage as a preliminary to a claim on a policy. In the general class of sexual offences, the figures for the full offence of rape and for the defilement of girls under 13 are lower. Here, the report suggests, the lower totals represent a genuine decrease in crime. On the other hand, the apparently serious rise in indecent assaults and the defilement of girls from 13 to 16 may, urges the official apologist, be due to a change in the moral outlook and to the greater interest taken by women in all that concerns their sex. The suggestion that women are now more ready to report sexual offences will, however, hardly explain the increase in offences between males. There seems to be a sharp rise in the offence of procuring abortion. The suicide figures are down, for the first time since the war; but attempted suicides are up. Comparisons here must be difficult, since it is the modern policy not to take proceedings for attempted suicide unless detention for a time is in the person's own interest or for other sufficient reason. The kind of offence which evilly disposed or mischievous people commit with the aid of motor-cars (often stolen) has increased sensationally—the smash-and-grab raid, bag-snatching and burglary, and house-breaking. The last-named offence seems to be committed with a certain impunity in country districts. Comparative annual totals

[1] H.M. Stationery Office. Cmd. 3581. 4s.

require, of course, to be coördinated with fluctuations in the population. The effect of the Criminal Justice Act of 1925, which enabled many offences to be disposed of summarily instead of being tried by indictment, is not easy to estimate. The official introduction furnishes useful material for attempting to understand the effect of education, the effect of the war, and the effect of shorter sentences; there is also some examination of drunkenness in relation to crime. The conclusions may not be universally accepted, but the figures cannot be ignored by the student of social conditions.

## EFFECT OF IRRADIATION ON RESISTANCE TO INFECTION.

In the June issue of the *British Journal of Experimental Pathology* Sir Leonard Hill, Prof. M. Greenwood, and Prof. W. W. C. Topley describe an experiment designed to test upon a numerically adequate sample of animals exposed to infection whether irradiation confers any immunity from fatal infection. Starting on April 24th, 1929, an infected herd was formed by inoculating 25 mice with pasteurella and adding them to 100 normal mice, housed in the type of cage employed in the study of experimental epidemics. Thereafter, three normal mice were added to the cage each day. By May 5th all the inoculated mice were dead, and no effective spread to the contact mice had yet occurred. On that day a second batch of 25 inoculated mice were added to the cage. Within the next few days some of the contacts died of typical pasteurellosis, and on May 15th the experiment began by the daily addition of three irradiated mice at the same time as the three regular controls. The treatment of the irradiated mice was as follows. The lamp employed consisted of a frosted vitrosil tubular mercury-vapour lamp, screened by a sheet of glass permeable to ultra-violet rays up to 2850 A.U., but not to shorter rays, along which on either side was placed a row of incandescent lamps sufficient in number to balance the blue light coming from the mercury-vapour lamp and produce colours—e.g., of flowers, equivalent to those produced by sunlight. The animals were placed in cages four feet below the lamp and exposed to the light for 48 hours. A fan was kept running to keep the cages cool. The cages were at first covered with gauze which allowed about half the light to penetrate; later this was done away with, and on July 17th the screen of glass was removed from the lamp to allow shorter ultra-violet rays to pass. The change did not alter the negative character of the results. On August 22nd six normal controls and no irradiated mice were added but, with this exception, there was no departure from the rule of adding daily three of each class. On Oct. 30th the last batch of immigrants was added, and on Dec. 31st the surviving members of the colony were killed. The tables supplied of the general vital statistics of the community show that the course of events differed in no significant way from that usually observed in such colonies. The planning of the experiment admitted of a direct comparison of the fates of normal and irradiated mice. Thus of the entrants to the community down to July 16th there were 189 irradiated and 189 normal mice admitted on the same days, and all of these died before the experiment was brought to an end. The mortality of the irradiated mice from the specific infection was insignificantly less and from other causes insignificantly greater than that of the control mice. The average lifetime of the controls was rather greater, when all causes of mortality were considered, than that of the irradiated mice. When mortality from all causes save the specific infection was ignored the two expectations of life were identical. It is clear that in this experiment, which involved the use of more than 1000 mice, irradiation conferred no advantage upon the treated animals in respect of the hazards to which they were exposed. To the possible criticism that the mice were not shaved the authors have a cogent answer: exposure of the naked parts of the head and feet to irradiation suffices to protect young rats fed on a rickets-producing diet against rickets, and it would therefore seem probable that the mice used in this experiment received an effective exposure, so far as the antirachitic effect can be accepted as a criterion of adequate dosage.

These negative results of irradiation with mice correspond with those of guinea-pigs recorded in the annual report for 1929 of the Lister Institute of Preventive Medicine. A pneumococcal infection among the breeding stock of this Institute, to which reference was made in the report for 1928, still persists, though not to any serious degree. A statistical analysis of the results of irradiating one-half of the breeding stock by means of a mercury-vapour lamp during a period of 12 months has been completed with the coöperation of Dr. P. L. McKinlay. No evidence was obtained that irradiation reduced the incidence of the infection or had any beneficial influence upon the general health and fertility of the animals.

The question whether exposure to ultra-violet light has any general beneficial action on the animal or the human body, apart from its specific effect on rickets, is still hotly debated, and more controlled investigations of this kind are needed. That benefit is felt by individual patients is undoubted. But, as with Hamlet's ghost, the problem whether the phenomenon is objective or subjective remains unsolved.

## LIVER EXTRACTS IN DIABETES.

The surprising success of oral administration of liver in pernicious anæmia has naturally fostered the hope that other diseases might respond to this treatment. Some 12 months ago H. Blotner and W. P. Murphy observed that liver, in spite of its relatively high content of carbohydrate and protein, is capable of lowering the blood-sugar when administered by the mouth, and they now record [1] further experiments bearing on the nature and action of this hypoglycæmic principle. In a series of diabetic patients they have studied the blood-sugar curve under the following circumstances: (1) after administration of extracts of liver treated in various ways; (2) after hypodermic injection of insulin; and (3) without insulin or liver extract. The curves were constructed from blood-sugar readings taken immediately before and at intervals during eight hours after a fixed meal consisting of 20 g. carbohydrate, 40 g. protein, and 35 g. fat. They find that an aqueous extract, prepared by soaking pulped liver in water at pH 4·6 to 5·2, and at a temperature of 35–40° C., contains the active principle which lowers the blood-sugar. Evaporation of this extract to a paste or a powder at 80° C. does not destroy the active principle, but exposure to heat above 80° C. causes it to deteriorate rapidly. They also observe that a precipitate forms after heating an aqueous extract at 80° C. for a few minutes, and that this precipitate contains almost the whole of the active principle. Incidentally, since the precipitate contains

[1] Jour. Amer. Med. Assoc., June 7th, p. 1811.

no sugar, while the supernatant fluid contains an appreciable quantity, this furnishes a simple method of getting rid of the undesirable carbohydrate. The effect of liver extracts on the blood-sugar is by no means startling. The equivalent of 500 g. of liver has roughly the same effect as 10 units of insulin, and the symptoms of hypoglycæmia have not, so far, been observed. Moreover, a lowered blood-sugar does not of necessity imply that the patient is receiving benefit. Nevertheless, it seems likely that liver extract will prove to be of practical value. In the severe grades of diabetes it may never be more than an adjunct, but perhaps the concentration can be further increased. The necessity of giving insulin by injection is a disadvantage which everyone is anxious to avoid.

## THE TRADER'S ACCESS TO THE TOWN DRAIN.

APPOINTED in November, 1927, the Joint Advisory Committee on River Pollution published in the following July its first report [1] dealing with the question of machinery and of the units best adapted to enforce the prevention of pollution. Its second report [2] deals with the problem of trade effluents in local sanitary authorities' sewers. The recommendations are based on existing provisions in local Acts; as is well known, experiments in public health and other matters are often given a local trial and found worthy of more extended application. The Joint Advisory Committee comes out frankly in favour of giving the trader a definite right to discharge his effluent into the sewers and of requiring the local authority to receive and dispose of it. This is the principle introduced in the Halifax Corporation Act of 1905 and various other local statutes since then. Certain substances are still to be excluded from the sewers; petroleum-spirit and liquids of abnormally high temperature cannot be received without risk of danger and nuisance. This exclusion, it is proposed, should be strictly maintained as contemplated by the existing general law. The local authority by a system of agreed local regulations is to secure that the effluent received shall be tractable and that the necessary sedimentation or other preliminaries shall occur before discharge; it is to have power to regulate the rate and volume of discharge, to impose reasonable charges and to provide for measuring quantities, inspecting effluents and taking samples. The local authority is also to have power to remove sludge or other deposited matter from the trader's premises; such matter will be produced in complying with the regulations and the removal of it is a service for which the trader is expected to be willing to pay. Among consequential recommendations is one to permit the local authority to enter into special agreements with individual traders. Existing written agreements for disposal of effluents for valuable consideration are to be safeguarded, and, where any trade effluent is already discharged into the sewers, the trader is to be deemed to have required the local authority to receive and dispose of it under the new principle. If capital works are necessary on the trader's premises to enable him to carry out preliminary treatment, the report suggests that local authorities be allowed to undertake such works on request and at his cost, and to advance him the amount of the expenditure on terms to be agreed. An excellent point here is that, if the trader provides works on his premises for the preliminary treatment of his effluent, in order to comply with the local authority's regulations, he ought not to find that his costs of production are thereupon increased by the increased assessment of his premises for rating purposes.

The exact purport of the Committee's present recommendations can be seen from a set of draft clauses appended to the report. They are not framed as a draft Bill and they are not to be taken as the last word in verbal form, but they are a useful summary. The report recommends fresh legislation of a universal and not of an adoptive nature. Local authorities may find it desirable to combine for these purposes and this they will be encouraged to do. It seems reasonable to hope that the new plan will have a better aggregate effect on the river. Efficiency ought to be greater if treatment is concentrated in a single centre under the control of the local sanitary authority. The present scattered system expects a number of manufacturers to purify their effluents separately; but their interest is in manufacture not in sewage disposal, and a small factory with a moderate daily volume of effluent often cannot afford a whole-time qualified staff for purification. Plainly the treatment and disposal of trade effluents should be the normal function of the local sanitary authority which already must receive and dispose of domestic sewage. Moreover, in a few cases the chemical or bacteriological nature of the trade effluent causes treatment to be cheaper and more efficient if there is dilution with ordinary domestic sewage. The crux of the new plan is to get rid of Section 7 of the River Pollution Prevention Act of 1876 and to clear away legal entanglements by giving the trader the right to discharge his effluent while obliging the local authority to receive and dispose of it. The idea is worth trying. It will give anglers new hope, while the general public may expect some restoration of ancient amenities even if their rates will cost them more, and the cause of public health should be served.

[1] See THE LANCET, 1928, ii., 562.
[2] H.M. Stationery Office. 6d.

## PROGNOSIS IN MENTAL HOSPITALS.

THE ability to forecast the fate of a person entering a mental hospital is important not only for the patient and his friends, but also for the administrators, who have to study their future accommodation. The State Charities Aid Association in New York has investigated the expectation of hospital life on first admission, and Dr. R. G. Fuller reports [1] on the fate of six groups, each of 600 male and 600 female patients, representing consecutive first admissions over a varying period beginning on Oct. 1st, 1909. The six groups chosen were manic-depressive, dementia præcox, senile, arterio-sclerotic, alcoholic and general paralytic, as the most important numerical groups in the State hospitals. All the cases have been observed over at least 15 years, and the results are set out in six statistical tables showing the number still in hospital, the number discharged, the number dead, and the relative proportions. It appears that more than half the general run of mental patients are out of hospital within a year of their admission, and that nearly three-quarters leave within five years. The manic-depressives seem either to be discharged within three years or to remain the whole period of 15 years. More than half the manic-depressive, senile, arterio-sclerotic, and alcoholic patients are out of hospital, either dead or discharged

[1] Psychiatric Quarterly, April, 1930.

at the end of nine months, though of course some of those discharged will return. As would be expected, the dementia præcox patients show the greatest proportion remaining in hospital at the end of a year; more than two-thirds of them fail to obtain a discharge. In every group there is a slowing of the rate of reduction in the number of patients in hospital in succeeding years. The first-year drop is a sharp one, the second year's is also sharp, and the rate gradually decreases to the end of the fifth year. From that point a reduction is extremely slow for general paralytics and manic-depressives, and for all groups it is slower in the second five years than the first. The great diminution in the numbers of senile and arterio-sclerotic patients in hospital throughout the whole 15 years' period is largely due to the high death-rate; discharges are relatively few. The number and proportion of women exceeds that of men for every period and group, the difference being most marked in the senile group. A remarkable number of manic-depressives die soon after their first admission, though their prospects of recovery and permanent discharge are much better than those of the dementia præcox cases. These show about the same death-rate at the end of the period, having made it up in later years. Female deaths exceed male deaths at every period in the dementia præcox group. As is well known to psychiatrists, there are more permanent discharges in the first year than in all the succeeding 14 years. Further comparisons and contrasts might be drawn from these tables; the figures on the whole serve to prove the well-known facts of mental hospital life.

## THE HYGIENE OF MENSTRUATION.

SIX thousand replies have been received to a questionaire on menstrual experience issued either directly, or through parents or teachers, to girls attending day and boarding schools in Great Britain by the London Association of the Medical Women's Federation. The correlation on statistical lines of the information received has been laborious, especially since the questions were framed under peculiar difficulties. In order to avoid disturbing the children no detailed questions were permitted, and such interesting matters as the age of onset, the presence of menorrhagia, and the type and site of pain could not be ascertained, though some children gave unsolicited information that the pain was slight or severe. Especially in those who complained of pain *after* the period the suspicion arises that local discomfort, smarting, or soreness, may have been meant, rather than abdominal pain. The most important practical point which arises from the inquiry is the need for better provision of facilities in schools and even in pavilions of playing fields for menstruating girls. The reticence about the hygiene of the menstrual period among women of all ages has been, and still is, a grave handicap in the way of abolishing bad traditions and of teaching young girls a régime conducive to health and comfort. The prejudice against baths during the period is only being broken down slowly, and the necessity for increased rather than diminished cleanliness at this time has hardly yet spread among the less educated. Nor is the young girl always properly taught to avoid the chafing which is often an intolerable plague to the schoolgirl. This may be particularly troublesome to the girl with a profuse flow, to the stout girl, or to the quite considerable number in whom the period is accompanied by a slight bladder irritability. It may need years of experience to teach a girl that this distress is unnecessary. A bath or a wash morning and evening, the use of simple dusting powders or ointments, and the selection of a soft material for the diaper should prevent any local irritation, more especially if a change of towel is available in the day time. Facilities have been immensely improved of recent years in factories, thanks mainly to the welfare workers during the war, in public lavatories at stations, in large shops, &c., and even in offices where large numbers of girls are employed. Slot machines, with enamelled bins for the disposal of soiled towels, are now found in many such lavatories, to the immense benefit of women clerks and shop girls. The schools and playing fields lag behind in this respect. Even such trifles as the use of an elastic rather than a rigid belt to hold the towel should be gone into. A further point of importance is to convince mothers and girls that menstruation ought not to be disabling, and that if it is treatment should be sought and persevered in as for any other ailment. Oddly enough, in spite of all experience to the contrary, many women still think that pain and disablement at this time are a rather meritorious and interesting sign of femininity, and they resist all suggestions for treatment. The fact that pain seems to become more common as the girl grows older adds point to the suggestion made in the report that the inquiry ought to be pursued to cover women over 18. The questionaire might be made more precise when the limits of menstrual disability could be more readily ascertained. Girls living at home, students at universities, nurses working in hospitals, and women employed in business would form suitable groups. It is to be hoped that the London Association of the Medical Women's Federation will pursue their inquiries under expert statistical guidance.

## HOME SERVICE AMBULANCES.

THE service of ambulances established by the Order of St. John and the British Red Cross Society, and now entering on its twelfth year, has justified its existence 847,065 times since its origin, by transporting that number of persons to hospital or to their homes. At the present time 343 stations form a chain of service from Northumberland to Cornwall, and though the committee makes no claim to perfection as yet, a steadily increasing number of calls are being met by a gradual extension of the service. The aim is to provide transport for the sick and injured in those districts of England and Wales where no other service is available, but with the rapid increase of motor traffic the ambulance is most frequently in demand for cases of accident. The work of the ambulance service in these cases is supplemented by the first-aid given at dressing stations, and by the voluntary assistance of members of the Order and the Society who patrol the roads during week-ends and bank holidays. First-aid boxes are being set up by the roadside in large numbers, and members of the St. John's Ambulance Brigade and the British Red Cross Detachment living near main roads are urged to keep a supply of dressings in readiness. A mobile X ray department has proved useful in those cases where removal to hospital or to an X ray installation is inexpedient. The plates are developed immediately in the dark-room of the car, and are later submitted to an expert radiologist. The only charges made for the use of ambulances are sufficient to cover the running costs and maintenance, with a small contribution towards a sinking fund for

their replacement when worn out; the members of the Order or the Society who staff the ambulances give voluntary service. Grants are given towards the cost of providing ambulances at the request of county representatives, and subject to certain conditions of maintenance and insurance. When it is remembered that 170,000 persons were killed or injured in road accidents during 1928, and that there is every possibility that this number will increase for some years to come, the extension and perfection of this ambulance service becomes a matter of individual concern.

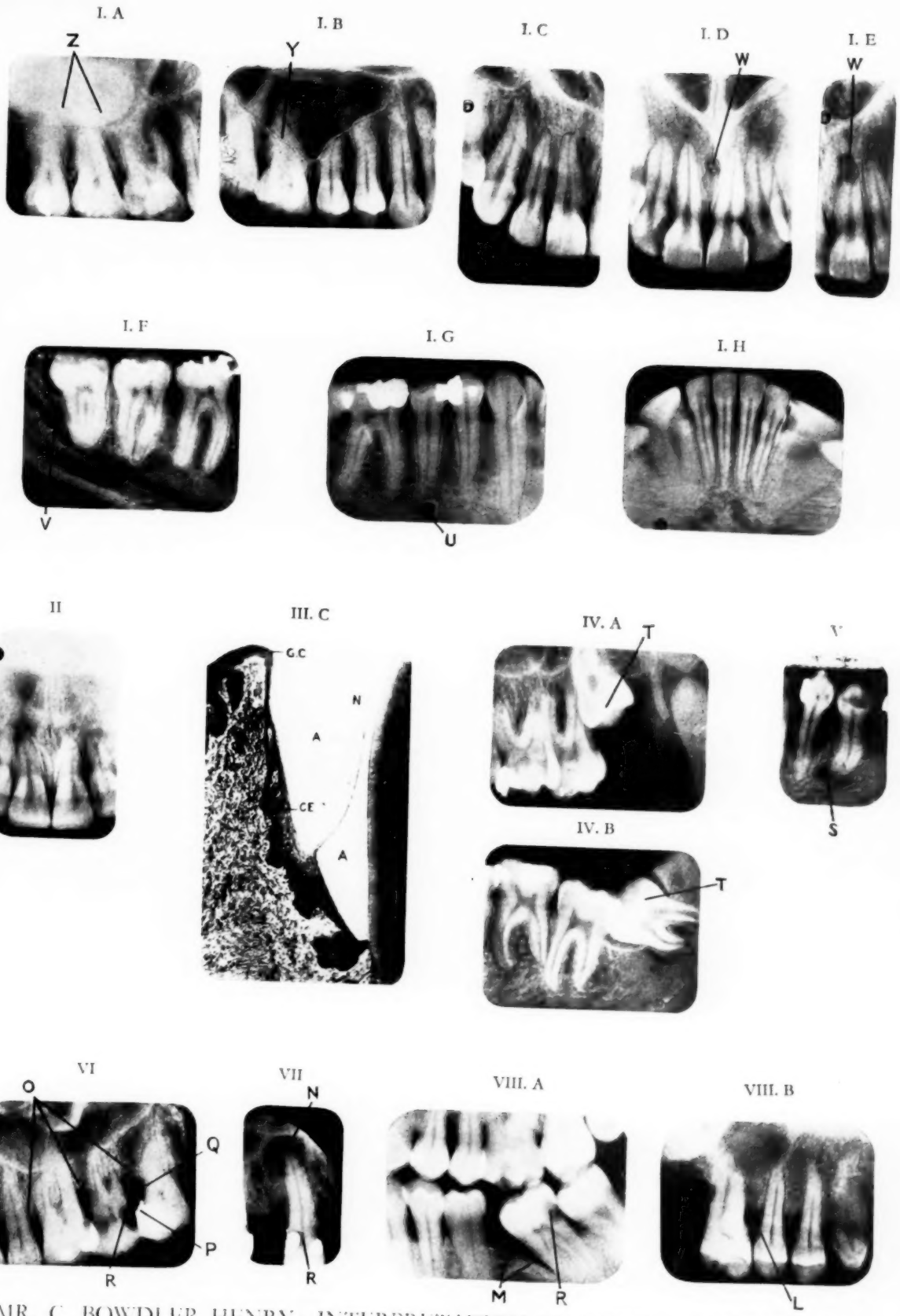
## THE TREATMENT OF VENEREAL DISEASE IN THE EAST END OF LONDON.

IN 1914 the treatment of gonorrhœa in a systematic manner was first undertaken by Mr. Frank Kidd in a very small room in the out-patient department of the London Hospital. The work was not at first officially recognised, but nevertheless it rapidly attracted a large number of patients. Mr. Kidd was assisted at first by Mr. E. C. Lindsay and Mr. G. Neligan, and later by Mr. R. Love and Dr. E. R. T. Clarkson. In 1917 a department for the treatment of gonorrhœa was officially instituted under the supervision of Mr. Kidd as chief of the Genito-Urinary Department. Dr. Malcolm Simpson was appointed chief clinical assistant in the women's section, and Dr. Clarkson chief clinical assistant in the section for male patients. In 1920, owing to the resignation of Mr. Kidd from the staff of the London Hospital, Mr. Hugh Lett became surgeon in charge of the Genito-Urinary Department and also director of the gonorrhœa section. The junior clinical assistants during the régime of Mr. Kidd were deliberately selected from the ranks of general practitioners and of London Hospital men who had recently qualified. The average number of junior clinical assistants was usually two in the female and five or six in the male section. Dr. W. S. Dwyer acted as registrar of the male section. The bacteriological work was carried out in the clinical laboratory of the hospital and in the bacteriological laboratory. Important changes in this centre have now been made. On Jan. 1st, 1930, Dr. Malcolm Simpson and Dr. E. R. T. Clarkson resigned their posts as senior clinical assistants but continued to work in an honorary capacity until April 1st. After prolonged negotiations, of a very involved nature, the annual grant of several thousands of pounds, contributed by the London County Council towards the work of the clinic carried out under the auspices of the London Hospital, was withdrawn, and we understand that on July 1st, 1930, the clinic ceased to have any direct association with the London Hospital. It has been taken over and staffed by the London County Council as an "ad hoc" institution for the treatment of gonorrhœa and syphilis under the directorship of Dr. T. Anwyl Davies, formerly senior assistant to St. Thomas's Hospital venereal disease department. Dr. Anwyl Davies has appointed as his senior assistants Dr. A. J. King on the male and Dr. N. Mascall on the female side, with two junior assistants, and the pathological work of the clinic will be done by Dr. I. N. O. Price. The clinic will continue to be housed in the lower storey of a block of buildings recently erected by the London Hospital, the upper part of which is occupied by house officers and the domestic staff. The L.C.C. will pay rent to the hospital for the use of the premises which will be supplied with a new entrance leading into a side street adjacent to Whitechapel-road. Henceforth the clinic will be known as the L.C.C. Venereal Diseases Clinic at the London Hospital, Turner-street, Mile End, E.1.

## THE EFFECT OF SAVING INFANT LIVES.

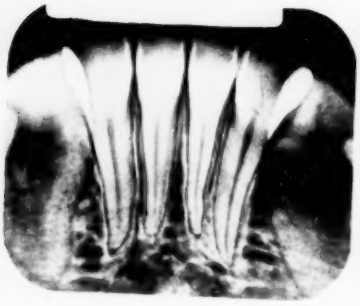
OUR success in the fight against infant mortality has certain conspicuous gaps. Speaking at the opening session of the National Conference on Maternity and Child Welfare at Friends House, London, on July 1st, Miss Susan Lawrence, M.P., described it as having a patchy distribution over the country, while Dr. T. H. C. Stevenson explained that neonatal deaths, which are less influenced by environment than the later deaths, are highest in rural districts, with a progressive improvement up to county boroughs. The inclination to regard reduction of the early infant death-rate as hopeless, he said, is not justified. The death-rate of the first month has already been brought down from 40 per 1000 in 1906 to 31 in 1928, while in the latter year Bath had a neonatal death-rate of 22, as compared with Walsall's 50, which showed that these deaths were not inevitable. Mrs. C. B. S. Hodson pleaded that infant mortality should be considered as part of a longer curve of mortality. From a biological point of view, she said, stillbirths and natural abortions cannot be separated from early deaths. Two factors always enter in—viz., constitution and environment—and there may be a point beyond which it is impossible or inadvisable to reduce early infantile mortality. Not only is a drop in birth-rate always accompanied by a drop in infant deaths, but there is a higher incidence of natural abortion and stillbirths for every parity. The interval between births is another factor of great importance, for Woodbury's investigation showed that infant mortality was lowest where births occurred at four-yearly intervals, though personal health and circumstances must of course be considered. Mrs. Hodson aroused some controversy by stating (with statistics) that there is no evidence that reduction of infant mortality connotes a reduction in the damage rate among children. She pointed out that the number of school entrants in London who can be classified as A 1 is falling steadily, and that, comparing the years 1914 and 1926, the amount of chorea, heart disease, and rheumatism among school-children has risen by nearly one-third. She further quoted Sir George Newman's report to the Conference on Mental Health to the effect that 10 per cent. of our population shows mental subnormality of some degree, and that the only cause he could suggest was that we had been saving 40,000 babies a year. This we must continue to do, but Mrs. Hodson urged a careful use of birth control for the wise spacing of families, and of sterilisation for those evidently unfit to bear children. Dr. Harold Scurfield expressed amazement that school entrants should be found in a worse condition than formerly, but Mrs. Hodson reiterated that, speaking for London alone, though the children were heavier and better cared for, a larger proportion arrived at school suffering from some constitutional defect calling for medical attention. Dr. S. G. Moore said that an inquiry made by him some years ago had proved that there was a reduction in deaths in each of the first five years of life, and suggested that closer scrutiny might be responsible for apparently less satisfactory figures.

FAR EASTERN MEDICAL CONGRESS.—The meetings of the Far Eastern Association of Tropical Medicine are held at intervals of two or three years. The last congress met at Calcutta in December, 1927, and the 1930 congress is to be held at Bangkok, from Dec. 7th–13th. The congress will be opened by one of the royal princes who is also Minister of the Interior.




MR. C. BOWDLER HENRY: INTERPRETATION OF DENTAL RADIOGRAMS.

IX. A



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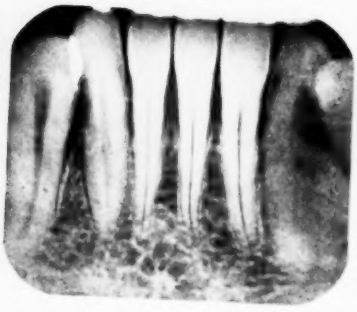
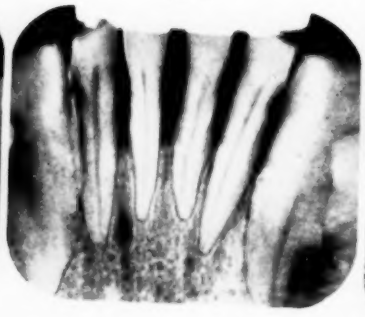


IX. E

IX. D

IX. C

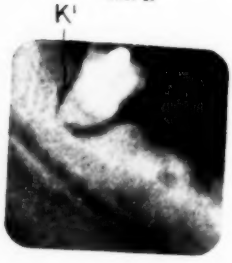


IX. F

X

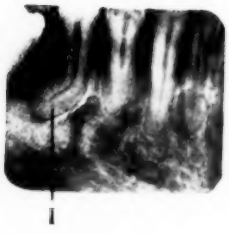
XI. A

XI. B




XII

XIII




MR. C. BOWDLER HENRY:
INTERPRETATION OF
DENTAL RADIOGRAMS.

# CLINICAL INTERPRETATION OF AIDS TO DIAGNOSIS

*(A Series of Special Articles Contributed by Invitation.)*

## LXXIX.—INTERPRETATION OF DENTAL RADIOGRAMS.

(WITH ILLUSTRATIVE PLATE.)

### PART I.—General Observations.

AT the outset it should be appreciated that a radiogram is but one link only in the diagnostic chain, and though it be a very important one, its value is directly proportional to its proper usage as one component of a whole. To condemn or to exonerate questionable teeth upon their radiographic appearances alone is to do so upon insufficient, and sometimes faulty, evidence.

When it is at all feasible, radiographic findings should be correlated with the results of a clinical dental examination. Dental surgeons and their patients sometimes suffer when a doctor, after a cursory inspection of dental films, expresses an opinion, often founded on an incorrect interpretation, contrary to the considered advice of the dentist. It is highly desirable, therefore, that the doctor should be versed in the interpretation of dental radiograms, so that he can correlate them with the clinical reports and decide on appropriate action. Though dental sepsis may not be sufficiently potent in a particular case to cause a secondary lesion, it is capable, even in mild degrees, of swinging the balance, and it may also put an effective drag on recuperation. Dental radiograms should therefore be taken in all cases of debility or chronic ill-health.

The practice of radiographing suspicious teeth and ignoring edentulous spaces is unwise; to take the patient's word that he is edentulous is often to miss a hidden source of focal infection. At the Mayo Foundation all patients are submitted to a dental examination, which includes a full set of films, as a matter of routine.

#### EXAMINATION OF DENTAL FILMS.

It is not sufficient to hold dental films casually to the light and note only the gross changes, such as impacted teeth, the outline of cysts, or the presence of obvious apical rarefaction. The films should be examined first generally by the naked eye and then critically with a lens over a suitably diffused source of light, such as an opal glass electric lamp

### DESCRIPTIONS OF ILLUSTRATIONS ON SPECIAL PLATE.

#### PART I.

The illustrations show one-half of a fairly normal set of dental films, some examples of errors of interpretation which may arise through taking radiograms from an incorrect angle, and some teeth with caries and periodontal disease. Some of the teeth have had fillings, shown as radiopaque (white) clearly defined areas.

FIG. I.—(A) Malar process often casts a radiopaque shadow (Z) over the apices of the upper molars.
(B) The antrum, delineated by an even line (Y), is in close proximity to the premolar and molar roots. In order to display the antrum this film was taken from an angle which makes the premolars appear foreshortened.
(C) Shows the canine, lateral, and central incisors, from left to right of film.
(D) Shows anterior palatine fossa (W) in correct position between the apices of the central incisors. The nasal fossæ are in close relation to the apices of the central incisors.
(E) Shows same fossa (W) superimposed upon the apex of the right central incisor, and might be mistaken for area of rarefaction. This film, of which the left half only is reproduced, was taken to show the lateral incisor. The angulation, therefore, was incorrect for the central incisors. This shows the need for taking enough exposures to obtain correct angulation.
(F) Inferior dental canal (V) shown below apices of molar teeth.
(G) Mental foramen shown as a dark patch (U) between and below apices of first and second premolars.
(H) Lower incisors.

FIG. II.—Foreshortening of the image of the upper central incisors (the same teeth as shown in Fig. I., D) due to using too high an angle. Foreshortening and absorption with regeneration of bone are easily confused, and confirmatory radiograms are desirable in all cases where foreshortening occurs.

FIG. III.,C.—Photomicrograph of the amelo-gingival junction in a young dog. Nasmyth's membrane can be seen sagging towards the tooth, the subjacent enamel having been dissolved away. The epithelial barrier formed by the junction of the membrane and epithelium of the gingival trough is the first defence to be broken by the ingress of pyorrhœa. A = Space created by the solution of the enamel. N = Nasmyth's membrane (enamel cuticle); the membrane collapsed towards the dentine on account of loss of support when the enamel was dissolved. G.C. = Gingival crest. C.E. = Crevicular epithelium.

FIG. IV.—Upper and lower third molars (T) in a boy aged 17. Owing to lack of developments antero-posteriorly in the jaws these molars are unable to erupt into normal position. The inclination of each presents the commonest variation. The lower is locked with the second molar and has prevented it from erupting normally. This boy's only sister (older), his mother, and his mother's brother had similarly impacted third molars.

FIG. V.—The mental foramen (S) is subject to variation of position and may appear in close apposition to the apex of the second premolar simulating a pathological area of rarefaction.
The first premolar in this film exhibits an advanced stage of local periodontal disease aggravated by traumatic occlusion with the teeth of the opposing jaw. Note the loss of alveolus and the open funnel-shaped socket produced by the marginal rarefaction.

FIG. VI.—Caries (R) in distal aspect of second molar shown as a black patch. Ragged edge (P) to faulty filling has encouraged food stagnation with production of a deep pyorrhœa pocket (Q). Advanced periodontal disease between molars in a patient of good resistance, who has put up a sclerotic barrier in the cancellous tissue of the septum (O).

FIG. VII.—Caries (R) below a filling shown as a dark radiolucent halo. Death and putrefaction of the pulp has led to chronic apical infection (N).

FIG. VIII.,A.—Shows evil following extraction of first permanent molar, viz.:—
(1) Occlusion with the opposing upper molars is thrown out of gear. Therefore loss of natural function and cleansing.
(2) Food impaction between the molars has produced caries (R) and an incipient pocket.
(3) Food stagnation under the tilting side of the crown has produced a deep pyorrhœa pocket (M). Ultimately the tooth will be lost.

FIG. VIII.,B.—Periodontal disease produced or aggravated by subgingival tartar (L) seen as projections on the side of the roots with well-defined pockets below.

#### PART II.

FIG. IX.—Progressive stages of periodontal disease destroying the alveolar sockets commencing at the margin in the incisor (A, B, C, D), and molar regions (E, F) of the lower jaw. Note the well-defined spurs of bone coming up between the teeth in IX., A, and disappearing in the remaining ones till the last one shows the teeth ready to fall out.

FIG. X.—General enlargement of the periodontal membrane (K) around a devitalised tooth.

FIG. XI.—(A) Shows the earlier stages of generalised thickening of the periodontal membrane (K) without loss of bone and often accompanied by a sclerosis of the lamina dura.
(B) Later stage of the same condition, sclerosis having extended into the neighbouring cancellous tissue, but rarefaction accompanied by the formation of a granulomatous membrane K', and loosening of the tooth has supervened.

FIG. XII.—A crescentic area of rarefaction (J) over the apex of the second premolar. This condition is of periodontal *not* pulpal origin and the tooth is absorbed not foreshortened—cf. Fig. II. It was removed under aseptic conditions, and three ampoules of broth inoculated with the first blood taken in a pipette from the apex of the socket gave a pure growth of *Strep. viridans*. The apex of the tooth also gave a scanty growth of the same organism in pure culture.

FIG. XIII.—Proliferation of cementum (exostosis) due to irritation of the cementoblast cells of the periodontal membrane, giving rise to swollen bulbous roots (I).

or preferably a proper viewing box. The films should be the best procurable. Even when the definition of the radiogram is very fine, imagination must play a large part in visualising the morbid anatomy of the parts seen, and therefore mediocre radiograms are misleading. Only the central portions, where the rays have penetrated the tissues and impinged upon the film with correct incidence, should be used, and the outer portion of a film where the image may be distorted should be discounted. A sufficient number of exposures should be made to make this possible. Twelve of the stock size dental films is, in my opinion, the minimum, supplemented when occasion arises by two more and by stereoscopic films of uncertain areas. The doctor should make it his duty to learn, by watching dental films being taken, the relative positions of tube, tissue, and film for the various groups of teeth in the average mouth.

Examples of the importance of taking several views are illustrated in Fig. I., E, where the shadow of the anterior palatine fossa has been transposed behind the apex of the lateral incisor, giving rise to the appearance of an apical rarefaction; and in Fig. II., where by using too acute an angle of incidence the radiologist has produced an appearance of foreshortening which resembles a type of absorption of the roots of the teeth occurring in one manifestation of dental sepsis. The desideratum is that the shadow of a tooth projected on to the film should appear identical in length with the tooth, but, as the dental film cannot be placed in an ideal radiological position, the factors of human judgment and error cannot be entirely eliminated. Some radiologists tend to foreshorten the images of certain teeth, whilst others tend rather to elongate them.

FIG. III., A.

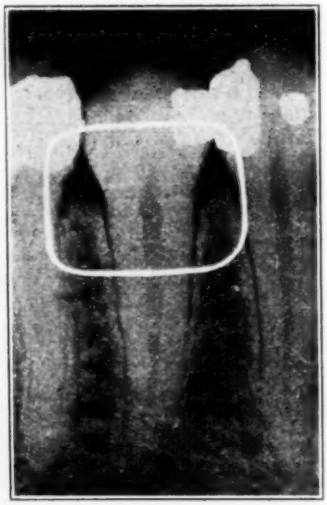
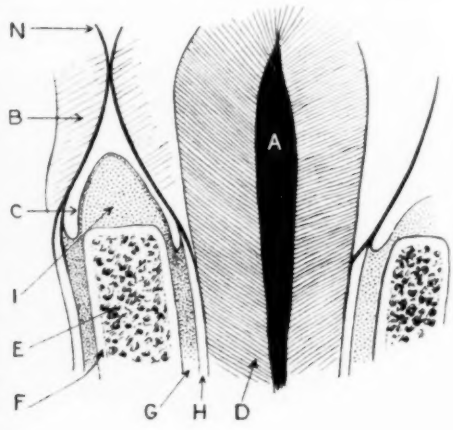


FIG. III., B.




III., A.—Enlarged radiogram of one of the normal premolars shown in Fig. I. A diagram of the framed portion is shown in Fig. III., B.

III., B.—A = Pulp. N = Nasmyth's membrane, an epithelial layer covering enamel (B) and reflected on to gum at the termination of the enamel in the gingival trough. C = Gingival trough lined by epithelium (see Fig. III., C). D = Dentine. I = Interdental papilla not visible in X ray, greatly filling space between the teeth. E = Cancellous bone of interdental septum. F = Lamina dura which appears as white line in X ray and is continuous over top of septum to the next socket. G = Periodontal membrane which appears as black line in X ray. It has strong fibrous bands which sling the tooth in the socket. H = Cementum which secures the ends of the fibrous bundles to the dentine.

With the films upon a viewing box in a suitably darkened room a general inspection should be made first to note general characteristics not merely of the teeth themselves, but particularly of the periodontal membranes and of the cancellous tissue of the jaws in this region.

## A General Survey.

In the general preliminary survey the following points should be noted:—

1. The arrangement of the teeth in relation to the normal position (see Fig. I.). In the normal young adult with a well-developed arch the teeth are arranged vertically in perfect order, the crowns of adjacent ones in contact but not overlapping, and the roots on all of them tapering to finely pointed apices. In length the roots are approximately twice the height of the crowns. When the premaxillary region is underdeveloped (due probably to early adenoids) the arch of the teeth is pinched in this region and malposition and overlapping of the incisor teeth in varying degrees result. Underdevelopment posteriorly causes shortening of the jaws in an antero-posterior direction, when the third molars (or wisdom teeth) of both jaws are unable to erupt easily in a vertical direction and may even remain buried. They are subject to considerable variation of position. Fig. IV. shows one of the typical misplacements, the importance of which is discussed below.

2. The presence of other unerupted teeth, supernumerary teeth, and foreign bodies, and the tilt or evidence of undue stress in teeth adjacent to edentulous spaces or supporting artificial dentures.

3. The character of the osseous framework generally and any gross changes in this tissue such as sclerosis or rarefication.

4. The position of those normal structures both radiolucent and radiopaque, which act as landmarks. Normal structures may be mistaken for pathological conditions, or may be encroached upon by morbid conditions occurring around the roots of the teeth.

### STRUCTURES IN THE MAXILLÆ.

The delineation of the *antrum* (Fig. I., B) by a thin layer of hard bone surrounding a radiolucent area above the molar and premolar teeth should be observed. This sinus extends sometimes as far forward as the lateral incisor, and is often mistaken for an area of pathological destruction especially when septa dividing it into loculi are present. Conversely, a small dental cyst invading the antrum may easily be mistaken for a loculus of that sinus. Stereoscopic plates and a comparison of the two sides are helpful in avoiding such errors. A large dental cyst displacing the floor of the antrum upward and filling the entire space formerly occupied by that cavity may also be unrecognised, but with this the physical signs are more apparent.

The *malar process* (Fig. I., A) often casts a radiopaque shadow over the apices of the last upper molar teeth, preventing clear definition. It should not be mistaken for an area of pathological sclerosis.

The tip of the *coronoid process* sometimes appears on an upper molar film.

In the front of the mouth the *median suture*, the *anterior palatine canal*, *foramen and fossa* (Fig. I., D) may be mistaken for periapical destruction above one or other of the central incisors, especially when the tooth is known to be pulpless.

The *nasal septum* often throws a radiopaque shadow across the roots of the upper incisors, and the *nasal fossæ* are sometimes observed in close relationship to the apical extremities of the central incisors (Fig. I., D).

The *canine fossa* over the lateral incisor and the canine varies greatly in depth, and radiograms of this region show corresponding variation in radiolucence.

### STRUCTURES IN THE MANDIBLE.

The *inferior dental canal* is seen extending forward below the roots of the molars and premolars in Fig. I., F. Disease

of these teeth is a frequent source of chronic trouble in this branch of the trigeminal nerve, which may persist indefinitely after the teeth themselves have been removed. It will be noticed that the canal is closer to the third molar than the other teeth, a fact which is of importance in surgical procedures connected with this tooth. Impacted third molars are found not uncommonly grooved, where they were in contact with the nerve.

The *mental foramen* (Fig. I., G) is seen as a radiolucent area between the apices of the first and second premolars. Sometimes it is hardly to be distinguished, but at other times it may appear so closely applied to the root of a premolar as to simulate a morbid condition of this tooth and forms a common pitfall in diagnosis (Fig. V.). If the radiogram is of proper texture determination may be greatly aided by tracing the inferior dental canal to the foramen and by radiograms taken from different angles, coupled with the electric test for vitality of the tooth concerned.

In the region of the lower molar roots and roughly parallel to the mandibular canal, but above it, is a radiopaque band. It is a shadow thrown partly by the *mylohyoid line*, which is lingual to the molar roots, and partly by the dense bone of the *external oblique line*, which passes to the outer side. In strongly built subjects this shadow is sufficiently opaque to obscure the detail of the roots of the last two molar teeth.

Having reviewed these anatomical variations before proceeding to the critical examination, it is wise to look at the radiograms as a whole, noting any change common to them all, such as increased or decreased definition of the roots, increased or decreased thickness of the trabeculæ of the cancellous bone, general loss of the alveolar edges, the presence of any unusual degree of apical rarefaction, or of sclerosis.

## Detailed Inspection.

After a general inspection radiograms of the teeth should be examined seriatim with a lens, the observer paying attention to the structures described below and shown in Fig. III., A and B.

1. *The crown.*—The enamel is clearly defined as a cap of denser material covering the exposed portion of the tooth, being thickest in the cusps on the masticating surface and thinning to its termination at the neck of the tooth, where it ends in a delicately chamfered edge (Fig. III., A and B) having no projecting ledge or sudden break. Fillings and artificial crowns should be made to imitate this smooth continuity of surface from root to crown as closely as possible, otherwise stagnation of food occurs at this rough place with injury and infection of the subjacent periodontal membrane, and ultimate caries in the root deep to the filling (Fig. VI.).

Caries beneath a filling may be seen as a radiolucent (dark) area extending even down to the pulp, and is a source of neuralgia and later of infection and death of the pulp (Fig. VII.). The position of the crown relative to its neighbours should also be noted. A slight breach at the point of contact, leading to food impaction, or undue tilting of the crown, interfering with proper cleansing, gives rise to caries (Fig. VIII., A) and to periodontal infection. For the same reason the presence of subgingival tartar should not be overlooked (Fig. VIII., B).

2. *The pulp chamber and canals.*—These should have a regular, clear outline. Secondary dentine—as an inward bulge upon the pulp boundary—or pulp nodules may give rise to neuralgia from a tooth externally normal and clinically alive. This deposition of dentine within the pulp and the much rarer destruction of dentine proceeding from the pulp outward are the only affections of the pulp which are portrayed in a radiogram. It is not possible to distinguish whether a pulp is dead or alive. When the pulp has been extirpated and the root filled with radiopaque material, such as gutta-percha, the apparent mechanical success of the operation should be observed; but a well-filled root does not necessarily mean a sterile, healthy root, for the dentinal tubules may be full of septic material. It is one stage better, however, than a poorly filled pulp chamber or than a pulpless tooth with no root filling at all.

3. The *root of the tooth, the periodontal membrane*, and the *lamina dura* of the socket should be examined together. The *surface of the root* should appear smooth and should pursue a regular course toward the apex. There should be no excrescences or excavations upon it and the apex should be moderately pointed, unless bending of the root toward or away from the rays hides it. As the dentine is denser than the bone, the shadow cast by the root obscures that of the superimposed and subjacent cancellous tissue, except occasionally toward the end of finely tapered roots, where the cancellous network may even interfere slightly with the shadow of the root apex. The *periodontal membrane*, interposed between the tooth and the wall of the socket, appears as a fine, black radiolucent) line, clearly defined and of even thickness, except at the apex of the root, and of almost the same tenuity as a hair. The *lamina dura* of the socket is seen as a thin white (radiopaque) line of compact bone covering the cancellous tissue of the alveolar processes. There should be no breach in its continuity.

4. The *crests* of the interdental septa are formed by the junction of the laminæ duræ of the adjacent sockets where they join that covering the cancellous tissue of the septum. Between the incisor teeth, where the interproximal spaces are narrow, the septal crest appears as a thin, elongated spine of hard bone formed by the convergence of the laminæ duræ of the two socket walls (Fig. I., C). Toward the back of the mouth, owing to the greater convexity of the crowns of the teeth, the interproximal spaces become broader, and here the lamina dura passes straight across from the margin of one socket to that of the next (Fig. I., G).

5. The *cancellous tissue* of the bone between and around the teeth. Its recognition is largely a consideration of the thickness of the trabeculæ, the spaces which they enclose, and their general arrangement. In the maxillæ the pattern is that of a fine, irregular small meshed honeycomb; while in the mandible the trabeculæ form large irregular spaces with a general tendency downward and forward in the premolar and molar region.[1] No definition, however, of normal appearing cancellous tissue can be given and in apparent health it is subject to considerable variation.

## PART II.—Periodontal Infection.

THE earliest radiographic sign of infection of the periodontal membrane, either from the gum margin or through the root of the tooth, is a thickening of the dark line of this tissue with an increasing blurring or irregularity both of the definition of the side of the dental root and of lamina dura of the socket wall. This was pointed out by S. Colyer eight years ago.[2]

Where a marginal infection of the ordinary gingival type is taking place, there is to be seen a localised thickening of the periodontal membrane, extending a variable distance down the side of the root towards the apex. This is succeeded by a solution of the lamina dura in those portions of the sockets to be affected earliest—i.e., the marginal interdental crest—and ultimately by the disappearance of the cancellous tissue subjacent to it. Distribution of the lesion in the teeth of the denture is determined by a variety of exciting factors. The disturbance may be localised to one tooth, being produced by a ledge of a faulty filing (Fig. VI.), or by subgingival calculus (Fig. VIII., B), or by an uncleansable area below the convexity of the crown of a tilted molar (Fig. VIII., A), and perhaps aggravated in this case by the trauma of faulty occlusion. Or it may be seen affecting all the teeth to a greater or less degree in the condition of general marginal periodontal disease associated with mouth-breathing or faulty oral hygiene.

Progress of the condition consists in the thickening of the periodontal membrane, preceding resorption of the alveolar bone. Detachment of connective

[1] Colyer, J. F., Dental Surgery and Pathology, fifth edition, 1923, chap. xxxvii.

[2] THE LANCET, 1922, i., 175.

tissue fibres from the affected surface of the root subsequently leads to "pocket" formation. The lymphatic drainage is mainly by the perivascular channels and, since these are mostly axial to the root, it follows that a pyorrhœa pocket tends to elongate towards the apex rather than to encircle the root (Fig. IX.).

The rate of extension of the disease appears to depend upon the local and general resistance of the individual. A periodontal pocket, however, should not be ignored. Under the most favourable conditions neglect of it will ultimately cause the loss of the tooth, an event of minor importance compared with the fact that the pocket acts as a portal, allowing ingress and ultimate entrenchment of infection in the cancellous bone of the jaws. Where a number of teeth are affected the area of absorption of sepsis becomes considerable.

The normal, but unobliterated, dental sulcus, situated behind a partially erupted lower third molar, may become a septic trough, forming a fertile pyorrhœa pocket which should be eliminated (Fig. IV.).

Another type of periodontal disturbance manifests itself as a *general even thickening* of the periodontal membrane. It may be localised to one tooth. In a dead one it is due to sepsis or some other irritating product diffusing through the substance of the root (Fig. X.). When it occurs around the root of a live tooth, this thickening indicates a state of chronic periodontitis, initiated by the trauma of faulty occlusion or some other mechanical force, and is significant of bacterial infection. In its earlier stages the black line of the membrane appears two to three times its normal thickness, with a corresponding thickening of the lamina dura if the resistance of the patient is good (Fig. XI., A); later, however, the membrane may appear 10 or 12 times its normal thickness, its wall of lamina dura has disappeared, and the root, instead of being clearly demarcated, has the appearance of being covered by a fluffy felt glove in contradistinction to a tight kid one (Fig. XI., B). A tooth in this state is invariably infected, and can cause constitutional disturbance. It may give rise to no local symptoms; but on examination it will be slightly loose, and if tapped lightly in an axial direction with the end of a metal instrument, it will give a dull damped note due to the cushioning of the swollen membrane in contrast to the resonant pitch of corresponding healthy teeth. In my experience there is a close correlation of this condition when it affects all the patient's teeth with intestinal toxæmia and with a raised percentage of streptococci in the fæces. In advanced cases a heavy growth of streptococci, usually in pure culture, is always present in the dental sockets. Remedial treatment of the gums and jaws is ineffective and temporary so long as the bowel remains deranged, and becomes a much easier matter and more lasting when the intestinal condition has been cleared up. The percentage counts of intestinal bacteria show an immediate drop in streptococci when the sepsis in the mouth is removed.

How far it is possible to correlate with the two definite types of periodontal lesion just described—namely, the marginal and the general—two other less easily classified disturbances, often to be seen in a set of dental films, is difficult to say. They are: (1) a condition in which an absorption of the root apex takes place, leaving either a crescentic-shaped radiolucent area capping the root in its place (Fig. XII.), or a regeneration of alveolar bone pari passu with the absorption; (2) a proliferative cementosis (due to irritation of the cementoblast cells of the periodontal membrane), giving rise to swollen bulbous roots (Fig. XIII). Proliferating cementosis may be either local round a devitalised tooth or general as a manifestation of periodontal disease.

The generalised periodontitis (previously described), which presents the swollen "fuzzy" membranes is usually not accompanied by a sclerotic reaction in the neighbouring alveolar bone and, since it is associated with ill-health of a toxic type occurring early in adult life, it may properly be regarded as periodontal infection occurring in a patient of poor resistance. In contradistinction, the type with the bulbous roots occurs usually later in life in individuals of robust constitution, and is associated with a sclerosing activity in the bone, which appears whiter than normal with thickened laminæ duræ and trabeculæ. It is seen in "gouty" people, by which adjective these teeth were formerly described. It is also toxic in origin, the only difference being the greater resistance and diminished susceptibility of the patient.

The remaining phases—that of absorption of the apex with concurrent regeneration of the bone and the similar condition, but without regeneration of bone, may be placed between the two main conditions, the former nearer the side of good resistance, and the latter towards that of poor resistance.

This radiological classification forms a useful basis for the computation of the dental sepsis present, and is of assistance in determining the form of treatment most effective in preventing persistence of it residually.

C. BOWDLER HENRY, M.R.C.S., L.D.S. Eng.,
Assistant Dental Surgeon, Royal Dental Hospital of London.

*Note.*—The first part of this article appeared in THE LANCET of March 1st, where the fine detail of the radiograms was partly lost in reproduction. The third part will appear next week.—ED. L.

## INFECTIOUS DISEASE

### IN ENGLAND AND WALES DURING THE WEEK ENDED JUNE 21ST, 1930.

*Notifications.*—The following cases of infectious disease were notified during the week:—Small-pox, 241 (last week 266); scarlet fever, 1584; diphtheria, 1019; enteric fever, 54; pneumonia, 722; puerperal fever, 48; puerperal pyrexia, 102; cerebro-spinal fever, 13; acute poliomyelitis, 3; encephalitis lethargica, 22; dysentery, 5; ophthalmia neonatorum, 123. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on June 24th–25th was as follows:—Small-pox, 399 under treatment, 9 under observation (last week 460 and 11 respectively); scarlet fever, 1925; diphtheria, 2030; enteric fever, 20; measles, 549; whooping-cough, 78; puerperal fever, 23 (plus 13 babies); encephalitis lethargica, 122; poliomyelitis, 1; "other diseases," 19. At St. Margaret's Hospital there were 15 babies (plus 6 mothers) with ophthalmia neonatorum.

*Deaths.*—In the aggregate of great towns, including London, there was no death from small-pox, 2 (1) from enteric fever, 31 (9) from measles, 6 (3) from scarlet fever, 22 (6) from whooping-cough, 28 (3) from diphtheria, 43 (8) from diarrhœa and enteritis under two years, and 22 (2) from influenza. The figures in parentheses are those for London itself.

Fatal cases of measles were more evenly distributed, Southampton and Birmingham each recording 3. Liverpool reported 7 deaths from diphtheria. Of the 35 deaths from diarrhœa outside London 6 each were reported from Birmingham and Liverpool, 5 from Manchester.

The number of stillbirths notified during the week was 303 (corresponding to a rate of 40 per 1000 births), including 49 in London.

# SPECIAL ARTICLES

## BIOPSY AS A PRELIMINARY TO RADIUM TREATMENT.

BY G. E. BIRKETT, *M.C.*, M.R.C.S. ENG.,

HONORARY RADIOLOGIST, MANCHESTER AND DISTRICT RADIUM INSTITUTE, AND CHRISTIE HOSPITAL FOR CANCER.

THERE is a considerable difference of opinion as to whether a biopsy should be performed as a preliminary to radium treatment. At the Fondation Curie the procedure is carried out in every case, and no case is included in the statistical records in which positive evidence of malignancy is not obtained. This is done principally in order to obtain absolute scientific proof that the cases treated were definitely malignant. On the other hand, there are a number of workers in England who consider that it is not in the best interests of the patient for it to be done as a routine in that the removal of a piece of tissue tends to stimulate growth locally, and to bring about metastasis by opening up lymphatic channels and blood-vessels into which odd cells may be implanted by the knife. It has been my lot to have dealt with almost no other cases than those of malignant disease for the past six years. In the earlier years the cases referred to the clinic were hopelessly inoperable or recurrent after operation. A study of these latter cases has convinced me that there is nothing worse in malignant disease than an incomplete operation, and that often increased rapidity of growth and metastasis follow rapidly in its train. Cases which come to mind are those of breast carcinomata, in which only a local amputation has been performed, or in which it is obvious from the length of the scar that the axilla could not possibly have been cleared. It is little short of a tragedy to see some cases which have been treated in this way referred for treatment with extensive local recurrence, diffuse infiltration of the skin flaps, and multiple outlying skin nodules. Occasionally I have seen an early epithelioma of the skin mistaken for an inflammatory lesion and incised, with subsequent rapid local spread. Lastly, I have for a long time been struck by the history given by some patients of the hospital class with carcinoma of the floor of the mouth. First of all a "sore place" was noted, and the removal of teeth advised. After which "it became worse," and surely enough the growth had spread rapidly along the alveolar margin whence the teeth had been removed.

Dr. W. E. Gye [1] in his Lloyd Roberts Lecture referred to the experimental fact that if an implant of Jensen's rat sarcoma in a mouse would not grow, the best thing to do was to incise it. Mr. Geoffrey Keynes also has told me that he has discontinued biopsy in breast carcinoma—a procedure carried out in his first fifty cases when the radium needles were being removed—owing to the fact that in some cases implants occurred in the scar of the skin incision. There was an old adage in connexion with rodent ulcers "Noli me tangere," and I believe in the old days the phrase was synonymous with the condition. Interpreted it would seem to mean that no treatment at all is better than incomplete or inefficient treatment.

Largely for the above reasons I, personally, do not encourage routine biopsy as a preliminary to radium treatment. In order, however, to appreciate the position more fully it is necessary to consider the various common sites of malignant disease, and also to assess the possible harm which may result from an incorrect clinical diagnosis if radium treatment is given.

### Buccal Cavity.

If a "lump" is present in the tongue, which is not ulcerated, with or without glandular enlargement, the diagnosis probably rests between gumma, tubercle, or malignant disease. If ulceration exists there is the same problem, whilst small, simple ulcers may occur in addition. The gumma is usually associated with other evidence of syphilis (i.e., a specific glossitis) and a Wassermann reaction can easily be performed. Even so malignant disease commonly is superimposed on a specific glossitis in the anterior third of the dorsum of the tongue, but the clinical differentiation is easy for the experienced observer. Tuberculous disease of the tongue is generally associated with well-marked and active pulmonary tuberculosis. The question naturally arises as to what is the result of radium treatment of a gumma or tuberculous disease in this situation. Commonly we treat an epithelioma of the tongue where there is an associated specific glossitis, and usually the associated leukoplakia disappears temporarily, later to return. No harm is done so far as can be observed. I have no experience of having treated a tuberculous ulcer of the tongue, but lupus vulgaris of the skin has been treated with no ill-effects. After all, radium treatment is a conservative method, and the position of the surgeon who in the past was called upon to do a partial or complete glossectomy for the condition was quite different. It seems to me that in this situation, which is notorious for the rapid spread of carcinoma to lymph glands, this spread being explained to some extent by the continuous state of "unrest" of the organ, biopsy is the last procedure one should adopt in the interest of the patient. It is true that we lose scientific proof that all the cases apparently cured are malignant, but if the clinic is a large one, then the number of patients so treated should outweigh any criticism of inaccuracy of diagnosis, which surely must be rare with experienced observers. Finally, the present method of treatment involves at most clinics a widespread removal of the lymphatic drainage area—a Crile's block dissection. From the material so removed sufficient evidence has already been obtained to confirm the clinical observation that radium can deal adequately with the primary growth in buccal carcinoma. This is not surprising when Regaud states that 65–70 per cent. of cases of lingual and sublingual carcinoma treated at the Fondation Curie showed secondary deposits in the lymphatic glands. On the other hand, the French school recommend biopsy in every case, but apart from the point that the scientific value of their records is obviously increased there seems to be no advantage to the patient in its regular performance.

Prof. G. Roussy [2] mentions the case of a gumma of the tongue diagnosed clinically as an epithelioma, which would have been subjected to a total glossectomy but for a biopsy performed at the instance of another surgeon. This criticism does not apply, of course, in the case of radium, which, as has already been noted, is a conservative method of treatment.

Roussy also describes a case in which the biopsy pointed to a chronic inflammatory condition, probably syphilitic, which was confirmed by the Wassermann

reaction. Happily a subsequent examination drew attention to other features, and a fresh biopsy showed a squamous epithelioma. The author's conclusion is that the case demonstrates the value of repeated biopsy; my own would be that the selection of the correct piece of material for biopsy depended upon the clinical skill of the observer. He also refers to the value of biopsy in the treatment of carcinoma of the mouth and tongue. Sufficient, however, is now known with regard to the histology of epitheliomata here, and the variations in type with site, for the clinician to say with a fair degree of certainty what the type and its relative radio-sensitivity will be. For instance, almost all epitheliomata of the base of the tongue are extremely radio-sensitive, and very advanced primary growths yield dramatic local results, such as are rarely obtained in the anterior part of the buccal cavity. For this reason one need rarely abandon hope here as regards the local result. On the other hand, epitheliomata of the anterior third of the dorsum of the tongue are usually superimposed upon a chronic specific glossitis, and the prognosis should always be to some extent guarded, since the response to radium is not so good as in an uncomplicated case. If the above facts are borne in mind I do not think that a biopsy is likely to improve the treatment of a particular case.

J. L. Roux-Berger and O. Monod [3] think that correct treatment is likely to be delayed without biopsy; in their experience a large number of cases is brought to them much too late for effective treatment to be given. It seems to me that their objections would be answered by the statement which I have often made that "all ulcers of the mouth and tongue which persist for more than a week or two in patients over the age of 30 should be regarded as being potentially malignant and referred for expert opinion." [4]

## Carcinoma.

### BREAST.

In the introductory remarks, reference has been made to the effect of incomplete operations, and most surgeons are not in favour of biopsy as a preliminary to operative treatment. On the operating table, they may, in a doubtful case, remove the tumour locally, and then incise it, but the tendency is to proceed to a radical amputation if doubt exists. Very few will actually excise a wedge for histological examination.

As regards radium treatment, there is as yet only a small number of surgeons who advocate radium treatment in early cases, and in those patients who are usually referred for this purpose the stage of the disease is such that the diagnosis is practically certain. If early cases are treated in the future there is, of necessity, bound to be a small percentage of error in diagnosis. There should be no complications and no mortality following incorrect diagnosis and treatment.

### CERVIX UTERI.

In most cases clinical diagnosis is easy. Occasionally the cervix is hard and nodular, usually as the result of multiple tears and subsequent irregular cicatricial contraction, whilst there may be slight bleeding on examination from the presence of erosions. When, however, these patients are examined under an anæsthetic their true nature becomes obvious, and the removal of a piece of the cervix does not settle the matter. Indeed here is a fallacy common to all biopsies, for the information provided depends upon the clinical skill of the operator in removing the correct piece of tissue. In other words, a negative finding does not prove that carcinoma is not present except in the section examined. This is well illustrated in the following opinions collected by Dr. J. Lane Claypon.[5]

Jung (1909) reports two deaths from peritonitis and pneumonia after vaginal disinfection of the growth and before the intended subsequent operation. Death was traced to disturbance of the growth. Risley and Leland (1917) refrain from removing a piece of tissue because of the real danger of dissemination of the disease. Döderlein (1922) regards biopsy as dangerous. Bowing (Mayo Clinic) (1923) says that biopsy, if done at all, should be made just before the second radium treatment, but even so is not without danger. Heymann (Stockholm) (1924) considers that the results with radium have improved in his clinic since the practice of taking tissue for microscopical examination has ceased. Heynemann (1921) says that there are two dangers in biopsy: (1) that the cancer is missed by incomplete examination of the tissue removed, and (2) that infection arises. He lost two early cases by peritonitis after biopsy. Ochsner (1924) says: "I have been impressed with the fact that there is a marked difference in the prognosis in cases in which a portion of the cancer has been cut out for microscopic examination, and those in which the tumour has not been disturbed. The former have invariably died of metastases, even in cases in which the cancer was not in an advanced condition at the time of operation, while in the latter cases we have seen nearly permanent recoveries especially since the introduction of radium and X ray treatment." He adds that he thinks the experienced surgeon should be able to make a diagnosis without removing a piece of the growth. Kupferberg (1925) says that a biopsy or any manipulation of the growth should never be undertaken. Better take the risk of a wrong diagnosis. Dyroff (1925), dealing with the Erlangen material, says that a biopsy is less dangerous after the first ray treatment but that the clinical diagnosis as to recurrence is more accurate than the histological.

### RECTUM.

There is considerable divergence of opinion with regard to the suitability of carcinoma of the rectum for radium treatment. Regaud holds the view that the adeno-carcinoma of the rectum is not radio-sensitive, and that such good results as have been obtained are due to excessive irradiation which has luckily been limited in its effects to the malignant tissue. On the other hand, Sir Charles Gordon-Watson [6] considers that the bad results in the past are due partly to poorness of access, and has developed treatment on these lines. His views on biopsy are as follows: "Whenever considered desirable a portion of growth is removed for section. In the earlier cases this was done at the time of the colostomy operation by means of a special punch. In later cases a portion has been removed at the same time as the needles. By the latter method there is less likelihood of stimulating metastasis. When early growths have been dealt with, it has been considered inadvisable to disturb the growth for the purpose of biopsy."

All observers are, however, agreed that carcinoma of the anal canal, a squamous epithelioma, is radio-sensitive and suitable for radium treatment. In growths which start at or near the anal margin a clinical diagnosis will usually suffice, but there will arise the case in which it is difficult to decide clinically whether the tumour has arisen from the rectum or anal canal. It seems, therefore, that in such cases a biopsy must be taken to decide whether one is dealing with an adeno-carcinoma or a squamous epithelioma, since excision is usually regarded at present as the method of choice in operable cases of rectal carcinoma.

### BLADDER.

In bladder carcinoma the danger of implanting growths by manipulation and trauma is well recognised by urologists. A suprapubic cystostomy has usually to be performed for the insertion of radium, and the advantages of inserting radium at the same time rather than to have to wait for a positive diagnosis

from a microscopical section and to reopen the bladder are obvious.

In all the above situations, with the exception of certain cases of carcinoma of the rectum, there would seem to be but little advantage to the patient, and certainly no disadvantage in not performing a biopsy. The main objection is the lack of scientific proof; but this surely need not be necessary if results from large numbers of cases are considered, in which the error in diagnosis should be very small.

### Other Tumours.

There is, however, a large group of tumours in which clinical diagnosis is difficult, and for which one cannot possibly lay down general rules. As a class one might refer to them as subcutaneous tumours. When they occur in areas known to contain lymphatic glands, as in the neck, axilla, or groin, a primary tumour elsewhere must be eliminated by careful examination. When this has been done the problem is infinitely more complex than that of any of the main situations which have previously been discussed. In the neck tubercle, Hodgkin's disease, lymphatic leukæmia, branchial carcinoma, secondary glands from a mediastinal tumour, or a carcinoma of the stomach all suggest themselves, as well as primary sarcomata of various types. Even the advocates of biopsy are against this procedure in the rapidly growing sarcomata at any rate, holding dissemination to be a real danger. If a rapidly growing tumour occurs in these situations probably the safest procedure is some form of external irradiation such as radium at a distance or deep X rays without a biopsy. In slowly growing tumours a biopsy is, one considers, necessary in order to determine the correct line of treatment. A branchial carcinoma would be treated by interstitial irradiation, a fibro-sarcoma by combined excision and interstitial irradiation, Hodgkin's disease by X rays—to give examples of the importance of a correct diagnosis. (The same line of argument is applicable to subcutaneous tumours elsewhere.)

Finally, there remains for consideration the importance of a correct diagnosis in situations in which the complications of radium treatment may be such that it would only be undertaken if no other method of treatment were suitable. Tumours of the nose and accessory sinuses are cases in point. The complications of bony necrosis following radium treatment are serious and distressing, and treatment should not be undertaken lightly. Biopsy is for these reasons preferable. Carcinoma of the larynx falls into the same category.

### Healing after Biopsy.

I have recently received the following statement in connexion with biopsy before radium treatment. "Some surgeons refuse to do a biopsy because they have found that healing is much retarded by the application of radium before the biopsy wound is completely healed, and on the other hand they do not think it justifiable to delay applying the radium until time has elapsed for complete healing to take place." It is difficult for me to criticise this statement on account of my personal attitude and practice with regard to biopsy. It would be quite easy to use the statement as an additional argument against its performance, but one does not feel justified in doing so for many reasons. In the first instance one should examine the usual result of radium treatment in certain ulcerative lesions, such as carcinoma of the tongue, epithelioma of the skin, and rodent ulcer. If surgical excision were performed in any of these conditions without any attempt being made to bring the edges of the wound into apposition, would healing occur more rapidly than it does after radium treatment? I do not think it would. Secondly, one should consider the healing of wounds which follows the insertion of radium by open operation. The operation may be a standardised one such as a radical amputation of the breast or a Crile's block dissection of the neck, and radium is used as an adjunct to surgical procedure. An increase in the normal tissue exudate is noted, but so long as good drainage is provided healing is not retarded. On the other hand, the operation may be for the purpose of providing good access for the insertion of radium, and probably the best example to take is that for the insertion of radium into the lymphatic drainage area in the neck in a case which is considered unsuitable for a block dissection. Skin-flaps are reflected in the same way and the sternomastoid muscle divided and reflected upwards. After the common carotid and internal jugular have been defined a large number of needles (30 to 40) are inserted into the area and the wound closed. The wound must be reopened in seven or eight days for the removal of the radium, and patients so treated are usually discharged six days later. Another common example of the combined use of radium and surgery is the mixed tumour of the parotid gland. They vary in radio-sensitivity and tend to recur locally. Commonly they are treated in Manchester by enucleation and the insertion of six to eight needles in the wound for two to three days. I feel sure that the surgeons who like this to be done would reconsider the position if healing were delayed and an unsightly scar the result.

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## ROYAL SANITARY INSTITUTE.

CONGRESS AT MARGATE, JUNE 21ST–28TH, 1930.

ABOUT 1600 delegates, members of the Institute and overseas visitors, including a large contingent from the American Public Health Association, attended this congress. In his presidential address Lord CORNWALLIS drew upon his long experience as chairman of the Kent County Council. He touched on the incomplete solution of the housing problem and its effect on agricultural labourers, and advocated the derating of small cottage property. In referring to the sanatorium deadlock, he hoped that the good work of the British Legion at Preston Hall Colony would be widely imitated. He anticipated much progress in schemes to benefit child life as the result of the establishment of the larger health unit. He looked forward to an increase in the number of voluntary health workers, and eulogised the work of such bodies as the rural community councils of Kent and Oxfordshire. The county of Kent was, he said, being urbanised in the neighbourhood of London, industrialised by recent colliery schemes, while it suffered like other parts of the country from the bungalow disease. Regional planning was urgently necessary, and a good beginning had been made in East Kent.

The congress then divided into six sections at which over 60 papers and addresses were submitted,

many of them coloured by the impending changes in local government.

## Imperial Responsibilities in Hygiene.

Presiding over the Section of Preventive Medicine, Sir ANDREW BALFOUR (whose address was read in his absence by Prof. JAMESON) said that England had been termed the cradle of modern hygiene, but he was afraid that visitors from overseas might get shocks on seeing the litter in the streets and the primitive scavenging arrangements in London and some of our great cities. Compared with the Dutch we were rather an untidy and not a very cleanly people, and until sanitary education had reached a higher plane we could not set an example to others. We had, however, recently risen to our graver responsibilities in promoting the health of our tropical possessions and smaller colonies, and a remarkable change had taken place in the way the medical and sanitary needs of native populations were viewed by the Colonial Office. The study of tropical hygiene had reacted on home hygiene and had drawn attention to insect nuisances in these islands. The outlook of the teachers of the future must be widened and the student of hygiene familiarised with some features of parasitology in the tropics. The Institute, he said, had realised its responsibilities in the training of sanitary inspectors for work overseas.

Dr. M. Z. SHAFEI, representing the Public Health Department of Egypt, spoke warmly of the services Sir Andrew had rendered to public health in Egypt.

## Education of Health Personnel.

### THE MEDICAL STUDENT.

Dr. G. F. BUCHAN (Willesden) dealt with the education of medical students, most of whom were, he said, destined for general practice. They must have specialists as teachers, but from interest in his own specialty the specialist was apt to forget the medical students' probable future, and in consequence the resolution adopted by the General Medical Council in 1923 as to the preventive outlook was ignored. There were exceptions. Bacteriology had always been treated in relation to prevention. More recently obstetrics and pædiatrics had assumed a preventive character, and surgery was following suit. Medicine, however, stood where it did. The school medical service came into being in 1907, and a generation was growing up accustomed to medical supervision. Before long, he thought, medical supervision would be applied to the adult, and the slogan of the New York Health Department, "Go to your doctor before he has to come to you," would be translated into some practical form of preventive medicine in this country. Some 30 years ago, when he was a medical student, he learned how disease had developed from the normal, but it was never suggested that at some stage of the process it might have been possible to arrest its course. In teaching, the demonstration of the grosser lesions of an incurable disease had always been more popular, because more spectacular, than the demonstration of the obscure symptoms of an incipient and curable condition. When school medical inspection began it was thought to be a job suitable for a young man fresh from hospital. It was now realised that the detection of the early beginnings of disease was difficult for an experienced practitioner. In his opinion the future of the health of the race, as well as the future of the medical profession, lay in regular medical examination and supervision. The medical student must have better facilities for the study of the normal. The medical graduate, as things were, might be turned out capable of discussing diets for diseases of altered metabolism, but unable to prescribe a suitable dietary for the maintenance of the health of a poor family.

### THE POST-GRADUATE.

Prof. W. W. JAMESON (London School of Hygiene) said the D.P.H. curriculum had changed much since it was instituted. He thought candidates should have some experience of practice before beginning such a specialised course of study, but he would like to hear opinions as to the G.M.C. rule that two post-graduate years must elapse before taking the diploma. At the London School they had instituted a part-time course which lasted one year, which included the 280 hours for the Part I. laboratory work in chemistry and bacteriology. They had also added applied physiology, which he considered of the highest importance and the basis of personal hygiene. Ventilation, lighting, and heating were best dealt with in a course of applied physiology, also nutrition, assessment of physical fitness, and industrial hygiene. They believed that they had successfully coördinated the laboratory work with the work of Part II. It was difficult to find a single public health unit where all the practical training in public health administration under a medical officer of health could be obtained, and they had met this difficulty, he believed successfully, by arranging for many special demonstrations under several health authorities and at many institutions. Their 12 months' course was part time, and he would much like to be able to establish a 9 months' full-time course which would fit in with the one year's leave of absence of the colonial medical service, and he hoped to get the consent of the G.M.C. to this modification. Anyone who took up post-graduate teaching undertook a serious responsibility, as this post-graduate work claimed the very best from the teacher. He was much in favour of short refresher courses for the senior medical members of the public health service. A great post-graduate clinical school was now being established for London. Why not have one also for the public health service?

Dr. A. S. M. MACGREGOR (Glasgow) said that the teaching hospitals admitted far too many advanced cases. He thought we should obtain the preventive outlook among practitioners more easily when the insurance system had been extended to dependants. As the medical officer of health was only to be an interpreter of results, the laboratory work in the D.P.H. curriculum might be cut down.

Colonel P. H. HENDERSON (War Office) approved Prof. Jameson's suggestion for a shortened course which would be suitable for army candidates.

Dr. E. H. CULVER (South Africa) said they had largely adopted home ideas for the curricula at their two universities, modified to meet local needs as to parasitology, &c. As a lecturer in physiology he had seen to it that applied physiology had a proper place in the Johannesburg course. In a new country they had not to fight old traditions, and thus Sir Leonard Hill's teaching was more in evidence in Johannesburg than at home, and the kata-thermometer was in use in their theatres. They also had useful fortnightly refresher courses for practitioners.

Surgeon-Commander G. H. HAYES, R.N., said the naval service was essentially preventive, and they also found the kata-thermometer useful.

Dr. W. BUTLER (L.C.C.) considered laboratory work very important for teaching accuracy, and thought they should be careful about making changes in the curriculum.

Dr. W. G. SAVAGE (Somerset) thought graduates might begin their curriculum for the D.P.H. immediately after qualifying, and that laboratory work was very important in keeping the scientific aspect in the forefront. Applied physiology should certainly be added to the curriculum. The 1923 G.M.C. resolution as to the preventive aspect was not being acted upon, and the Council must be pressed to make effective what was at present only a pious aspiration.

Prof. HAROLD KERR said the preventive aspect had permeated the Durham curriculum. He thought the public health courses for the medical student might be made more interesting.

Dr. F. MIRANDA said the work of Mackenzie was highly esteemed in Mexico, and the doctrine that it was too late to try to cure diseases when anatomical changes had taken place. The curriculum at Mexico University included both physiology and physiological pathology. They endeavoured to lay stress, not on the name of the disease, but on the nature of the deviation from the normal.

Prof. A. BOSTOCK HILL (Birmingham) said no mention had been made of propaganda, and pointed out that the public were being gra ually weaned from the bottle of medicine to the preventive outlook, thus preparing the way for periodical medical examinations.

Prof. JAMESON, in replying, again emphasised the importance of applied physiology. He also mentioned that the teachers of physiology had succeeded in having it recognised as a pure science, thus perhaps increasing the difficulty in securing a teacher for applied physiology.

### TRAINING FOR THE TROPICS.

Dr. ARTHUR E. HORN (Colonial Office) put forward a convincing case for the special training of the staff, who were to work in the tropics, and deal with such diseases as malaria, yellow fever, filariasis, and schistosomiasis. A knowledge of insectology and parasitology was essential. For example, every kind of anopheline mosquito was not equally effective as a vector of malaria. In one district in Malaya, where there was a high incidence of malaria among the coolies, *Anopheles umbrosus* was incriminated—a type which lays its eggs in water thickly covered by bush. The bush was cleared away and *umbrosus* with it, but unfortunately the much more deadly *maculatus* flourished in the now bright sunny waters, and the last state of this place was worse than the first until the bush was allowed to grow again and the waters were dealt with by other means. A staff is thus required who are able to make use of the expensive lessons learned by experience. There is also much further research to do. We have more to learn about the conditions under which mosquitoes become dangerous to man. The precise cause of yellow fever is not yet known, or if a man can contract the disease by other means than the bite of an infected mosquito. No serious attempt has yet been made to eliminate the mosquitoes which convey filariasis and its occasional sequel elephantiasis. Dr. Horn went on to refer to the methods of dealing with the devastating epidemics of sleeping sickness and with ankylostomiasis, and concluded that there was at the present "great need for the study of all branches of parasitology and less demand for the finer aspects of chemical and physical analysis; a wider field for the employment of simple sanitary devices and less opportunity of employing more complicated engineering schemes."

### SANITARY INSPECTORS.

Mr. H. T. PERRY (chief sanitary inspector, Kingston-on-Thames) outlined a suitable course of training for sanitary inspectors. He visualised a student leaving the county school at the age of 17 after passing a matriculation examination and spending four years in going through the routine of a health office, first as clerk and then as assistant inspector, and throughout the whole period going through a complete course in building construction and other subjects at a technical school, and sitting for his qualifying examination at the age of 21.

Mr. H. CLAY (lecturer in domestic sanitary engineering, London School of Hygiene) thought the present scheme of training was good, and that numbers of suitable young men were being turned out by the technical colleges annually who, after a period of pupilage in a health office, would make efficient inspectors. It would be an advantage if scholarships were available as in Willesden.

### HEALTH VISITORS.

Miss A. A. HARRISON dealt with the training of health visitors and the changes in their work and qualifications during the last 25 years. Beginning with the same certificate of the sanitary institute as that held by men, the qualifications of trained nurse and certified midwife had been added and health certificates issued by many bodies, ending with the attempt to establish uniformity by the Ministry of Health.

Mrs. C. B. S. HODSON (Eugenics Society) advocated instruction in eugenics for health visitors, seeing that the health visitors from their knowledge of the families were in an ideal position for giving advice in suitable cases on birth control. During the discussion,

Dr. J. J. BUCHAN (Bradford) mentioned that there was a great dearth of health visitors at the present time. He was not satisfied that they had reached finality in their methods of selection. He did not think it was possible to find out the suitability of a woman for this work by any examination.

Dr. J. A. FAIRER (Leicestershire) said that up to now they had had no difficulty in obtaining health visitors as long as they paid a proper salary, but they had experienced difficulty and lost good workers when the county council in a fit of economy reduced the salaries from £180 to £150.

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## EPSOM COLLEGE.

THE seventy-seventh annual general meeting of the governors of Epsom College was held on June 27th, at 49, Bedford-square, when the chairman of the council, Dr. Raymond Crawfurd, presided. The scrutineers, Sir William Hale-White, Mr. W. Cyril Tomlinson, and Dr. Septimus Sunderland, reported the successful candidates as under:—

PENSIONERSHIPS.

| | Votes. |
|---|---|
| *Nicholson, Mrs. Agnes A. .. .. .. | 6987 |
| †Cadman, Dr. Ernest S. R. .. .. | 6137 |
| †Greenwood, Mrs. Marie M. .. .. | 4471 |
| †Humphreys, Dr. Edward A. .. .. | 4334 |

* Brodie Sewell Pensioner. † Ordinary Pensioners.

FOUNDATION SCHOLARSHIPS.

| | Votes. |
|---|---|
| Taylor, David H. .. .. .. .. | 15,941 |
| Daw, Ian Almeric .. .. .. .. | 11,509 |
| White, John H. B. .. .. .. .. | 10,389 |
| Butler, Gerald A. .. .. .. .. | 9,409 |

The secretary reported that Dr. Edward W. Forster, who was at the head of the list of unsuccessful candidates, would be appointed an ordinary pensioner

under By-law 16 at the council meeting which would be held immediately after the annual general meeting, a vacancy having arisen.

Dr. Crawfurd, in submitting the report of the council to the governors, spoke briefly of the progress of the school and the position of the medical foundation. While the annual subscriptions were slightly less, the difference could be regarded, he said, as an accident; there was a moderate surplus on the income and expenditure account, and the numbers in the school had gone up. The general story was one of progress. He alluded to the loss which the school had sustained by the death of Lord Rosebery, who was president for 29 years, and took a practical interest in its activities. In obtaining the consent of Lord Burnham to succeed Lord Rosebery he considered that the governors were to be congratulated.

The following were elected vice-presidents of the College, in recognition of valuable services rendered: Lord Dawson of Penn, Sir Milsom Rees, and Mr. T. Hollis Walker, K.C.

A cordial vote of thanks to the chairman concluded the business.

## BERLIN.

(FROM OUR OWN CORRESPONDENT.)

### THE LÜBECK DISASTER.

THE number of deaths at Lübeck has increased to 46, and 68 children are still gravely ill. As is often the case in this country, the sad event has become a political question. The opposition in the Lübeck Parliament moved that the men responsible for the accident should be dismissed for negligence. The motion was adjourned until the case has been fully elucidated, but criminal proceedings for bodily injury by neglect have now been instituted against the medical director of the Lübeck Health Office, and the chief physicians of the State Hospital and the Children's Hospital. The Lübeck Senate has announced that it will bear the expenses of the treatment of the infants both in hospital and at home. Prof. Calmette, in a letter to a Berlin daily paper, says that such an accident as the one at Lübeck has never occurred with B C G, and that obviously, by a regrettable mistake, the infants received virulent tubercle bacilli. Speaking at the Berlin Medical Society, Prof. Lange discussed the theoretical basis of the Calmette method without mentioning the Lübeck disaster, and stated that numerous experiments on animals and observation on patients have proved the method innocuous. Medical men were thus justified, he says, in trying its immunising action with the necessary precautions.

### ZEILEIS *v.* LAZARUS.

The action of Zeileis against Prof. Lazarus, mentioned in my letter of April 5th, was recently tried before a court in Berlin. The action was originally brought to prohibit Prof. Lazarus from stating that the Zeileis method was a humbug and obnoxious, but lately the plaintiff, obviously fearing that the defendant would be in a position to corroborate his statement, only demanded an injunction to restrain him from pretending that he had studied the method at Gallspach. At the hearing Prof. Lazarus gave evidence that he had not been allowed to enter the consultation room in Gallspach, but that he had interviewed there the constructor of the apparatus, an electrical engineer, who had explained to him the technical arrangements; he had also consulted, as an alleged patient, two medical men in Munich who used the Zeileis apparatus. Showing a Zeileis tube to the court he broke it, saying that he would make an end of that humbug. The court gave judgment for the defendant, stating that Prof. Lazarus had rightly declared that he had studied the external features of the procedure in Gallspach, that he had ascertained the nature of the apparatus in Zeileis's residence, that he had become acquainted with the therapeutic methods by consulting disciples of the master, and that being a specialist in radiotherapy he was thus in a position to give an opinion on Zeileis's claims.

### ABORTION IN RUSSIA.

Dr. Karlin, of Leningrad, reports in the *Archiv für Frauenkunde* on the results of legalising artificial abortion in Russia. He states that in the larger cities, where abortion is now performed in hospitals exclusively, deaths are no longer recorded, and pathological sequelæ have been reduced to a small number. In the country, however, where women, owing to their great distance from an authorised hospital, continue to apply to professional abortionists, deaths and disease are still common. Since December, 1928, a second abortion has been allowed only nine months after the first abortion. The method used is curettage with subsequent irrigation. Perforation has become unusual, and if it happens its danger is much reduced, because a laparotomy can be performed at once and the woman, being already in the hospital, is not endangered by transport. Poverty is not the only motive for women desiring to abort; there are other motives, such as the desire to be socially independent, or to give the children a better education. Some are afraid of parturition, and of the strain of bringing up children. A few only desire the operation because they are ashamed of being pregnant without being married. Although the immediate danger to life and to health has become comparatively small, Karlin is of opinion that the indiscriminate production of miscarriage must be combated, because of its later sequels. Among these are a prolongation of the first and second stage of labour in later deliveries, defects of the placenta, and deficient involution of the uterus. Amenorrhœa and neuroses are especially frequent in women who have undergone artificial abortion without a previous normal birth. The medical man should, however, consider social indications, such as poverty, numerous previous children, and divorce from the father, as well as medical indications.

The legality of operative abortion is much discussed in Germany, where a reform of criminal law is now in preparation. The matter is treated not only in books, in public meetings, in lectures, but also in plays. Hitherto, abortion has been allowed for medical reasons only, and women desiring to abort for other reasons apply for clandestine operations to professional abortionists, death being a common sequel. Owing to the danger incurred these abortionists charge highly. The mother herself, if denounced, is prosecuted also, and her life is often ruined. The Deutsche Ärztetag, notwithstanding those nuisances, has at one of its last meetings petitioned that artificial abortion, if not performed for medical reasons, should be punished by the forthcoming criminal law. On the other hand, the Berlin association of medical women urges that artificial abortion, if performed by a qualified medical man or woman for social reasons, should be legal. The Criminal Reform Bill is still in the stage of committee discussion in the Reichstag.

### ALTITUDE AND HEART DISEASE.

In a paper read before the Berlin Medical Society on the influence of altitude on the circulation, Dr.

Aron said that on theoretical grounds it had been thought wrong to send cases of heart disease and hyperpiesis to high altitudes. Nevertheless, patients of this kind often feel very well at high levels. They must, of course, be cautious and abstain from over-exertion, especially climbing. Moreover, those with poor compensation and with progressive arterio-sclerosis must not be sent there, since a certain reserve of cardiac strength is indispensable. Concerning the blood pressure, Dr. Aron said that some authorities have found an increase, some a decrease, and some no effect at all. The advantage of the mountain climate lies in the dryness of the air, which leads to a certain amount of desiccation of the body, and thus relieves the heart and kidneys. Hæmorrhage in the eye, the nose, and the lungs occurs at very high altitudes and under experimental conditions, but never at the heights at which the mountain health resorts are situated. It has been observed that patients with Graves's disease feel especially well in high altitudes, notwithstanding the disorders of cardiac function associated with that disease. Dr. Aron reported experiments made in a low pressure chamber where the pressure was reduced by a quarter of an atmosphere, being equal to an altitude of 2000 metres. His observations supported the opinions already set out.

## IRELAND.

(FROM OUR OWN CORRESPONDENTS.)

### HOSPITALS AND SWEEPSTAKES.

AT the meeting of the Diocesan Synods of Dublin, Glendalough, and Kildare, held last week, the Archbishop of Dublin declared his intention of refusing his support, or the granting of any facilities as far as he personally was concerned, to the Dublin Hospital Sunday Fund, if it gave any grant to hospitals which availed themselves of the powers recently given by the Act permitting sweepstakes in aid of hospitals. The Fund, which is mainly made up of church offertories, has hitherto received considerable support from the churches of the diocese. It is to be feared that if the churches fail to support the Fund in which they have been interested they are likely to lose touch with the hospital charities altogether. The difficult problem of the hospitals is not likely to be helped by the Archbishop's intervention.

### AN ACTION FOR DAMAGES.

In the High Court, Dublin, last week, before Mr. Justice Sullivan, a case was heard in which Mr. Patrick Moore claimed damages against Dr. Michael Walsh, of Dublin, for alleged negligence on May 6th, 1927, in certifying that the plaintiff was a dangerous lunatic. Without leaving the box, the jury found that there was no negligence, and judgment was entered for the defendant. It appeared from the evidence that in May, 1927, the plaintiff heard wireless messages warning him that he was pursued by assassins. He fled to Kingstown Harbour to seek the protection of a British warship and went on board the Irish light steamer *Irene*. He was there arrested by the police, and he attempted to escape by jumping out of a boat. The magistrate, before whom he was brought, ordered Dr. Walsh to examine him and report on his condition. Dr. Walsh certified him as a dangerous lunatic, and he was detained first in the Grangegorman Mental Hospital, and later, by order of the Chief Justice, in a private mental hospital at Glasnevin. The superintendents of these two institutions gave evidence that at the time the plaintiff was under their care he was suffering from delusional insanity. The same plaintiff had some months ago initiated proceedings against these two gentlemen, but the actions had been stayed by the courts as vexatious.

### THE IRISH MEDICAL ASSOCIATION.

The annual meeting of the Irish Medical Association was held in Dublin on June 25th, with Mr. P. E. Hayden, the President, in the chair. The annual report showed that the membership of the Association on Dec. 31st, 1929, was 388. This was less by 21 than in the previous year.

### THE LATE DR. HOUSTON.

Dr. John Carson Houston died in Belfast on June 27th after a short illness following operation for gall-stones. He was educated at the Royal Belfast Academical Institution and the Queen's University of Belfast where he won a reputation as a redoubtable Rugby football player. Qualifying in 1909 at the last examinations held by the Royal University of Ireland he took up house appointments at the Royal Victoria Hospital, and later at Belfast City Fever Hospital. During the war he served for several years in France with a commission in the Royal Army Medical Corps. Afterwards entering practice in the north end of Belfast he built up a large connexion, and his professional knowledge and sound judgment inspired confidence in his patients. Outside his work he was a keen geologist and had a remarkable knowledge of English poetry. Silent and reserved among strangers, among intimates he was full of quaint humour and mature thought. He occupied a high position in the esteem of his colleagues, and will be remembered as a kind and skilful physician and staunch friend. He died unmarried.

## APPLIED PHYSICS.

### ANNUAL INSPECTION OF THE NATIONAL PHYSICAL LABORATORY AT TEDDINGTON.

THE annual inspection of the National Physical Laboratory by the General Board took place last Friday, June 27th, when Sir Ernest Rutherford, chairman of the Board, and Sir Richard Glazebrook, chairman of the executive committee, welcomed more than a thousand visitors. During the afternoon various experiments and pieces of apparatus were on view, a total of over seven hundred exhibits, and choice was difficult. The fascination of delicate instruments of precision, the excitement of a train of experimental difficulties overcome by sheer ingenuity, the marvel of such large-scale working as was seen in the wind tunnels and in the colossal equipment of the high-voltage building, the simple delight of a ride along the water tank—all followed in rapid succession, as the visitor passed from building to building. The demonstrations may be divided into five overlapping groups.

In the section of *Standards* measures of all kinds were shown, from those of weight and distance to precision electrical resistances. These ranged up to 10,000 ohm, and were constructed of two materials of opposing temperature coefficients to make them independent of thermal variations. Methods for the

comparison of standards and for the estimation of characteristic coefficients included those for the determination of international standard freezing-points at high temperatures by means of a valve-controlled vacuum furnace and for the measurement of X ray intensities in terms of the new international unit. The methods used for the rating of instruments of common use, such as watches and clocks, thermometers, telescopes, and speedometers were also on view.

In the section of *Materials* the relationship between the macro-and micro-structure of cast alloys were demonstrated. The methods used for the manufacture and for the study of the constitution of alloys of iron-manganese and iron-chromium could be seen and also the electrolytic preparation of pure beryllium. The examination of the behaviour of mild steel under bending tests in various media with its application to the cracking of boiler plates, the investigation of the mechanism of "creep" in metals under prolonged loading at elevated temperatures, and the research on chains and hooks, all provided examples of the direct application of these studies. These applications were carried further into the fatigue tests on crystals of silver, antimony and zinc, corrosion fatigue tests in vacuo, and high speed fatigue tests on spring plates under reversals of bending strain. The examination of electrical insulating materials under high voltage tests, of X ray protective materials and their efficiency, and of leakage from radium tubes were to be seen in operation.

In the section of *Experimental Methods* were some recently devised laboratory tricks for special purposes. The shadow of smoke from titanium tetrachloride was thrown on a screen to render visible various types of fluid motion. Water was pumped through a glass tank past fixed obstacles of known shape, and the consequent eddies and main lines of flow were thus thrown into sharp relief. This is of use in determining the nature of the wake left behind moving bodies, whether in air or in water, and is being applied to problems of aeroplane design. A very pretty method of detecting flaws and surface cracks in metals, too fine to be otherwise seen, was demonstrated in the metallurgy building. A suspension of fine iron particles in paraffin is poured over the metal while this lies in a strong magnetic field; the intensification of the field in the neighbourhood of cracks and flaws leads to the local deposition of the particles which etch-in these defects in a remarkably clear way. The two shops for the construction of model aeroplane parts and of ships models respectively were full of delightful workmanship. The joinery and lathe work in the former were of a very high order, and in the latter the cutting of model hulls from wax and the making of model aluminium propellors, both carried out automatically to any predetermined form, attracted much attention.

In the section of *Machinery Testing* several pieces of work were being carried out for the Ministry of Transport. An experimental trailer for the determination of tractive resistance and wheel impact, vibration recorders, and remote recording accelerometers were to be seen, some of them in use. Elsewhere the testing of rear reflectors for bicycles and the brightness-difference-threshold meter for estimating glare had direct reference to road vehicle lighting. The acoustics of buildings came under examination in Bushy House. Here the application of sound-pulse photography, a three dimensional model of an auditorium and a ripple tank for the two dimensional investigation of acoustic reflections were to be seen. The lighting of buildings, in respect of the efficiency of light wells, was being investigated, and the ten-foot sphere for the examination of lighting fittings was shown. Outside the high voltage building a spectacular demonstration of flash-over tests on porcelain insulators under artificial rain was made; with a series of vast sparks and artificial thunder-claps it was shown that the effective value of these particular insulators was lowered by 10 per cent. in rain.

In the section of *Design* come the two pieces of large scale research into aeroplane and ship hull design. In the duplex wind tunnel a model was being used to determine the best position on an aeroplane wing for an engine nacelle; beneath the tunnel was shown a complete model aeroplane suspended from a series of electrical balances for the measurement of yawing and rolling movements. In the William Froude national tank a model of an ocean cargo boat which has been for some time working across the Atlantic was under test. It was propelled by its own screw, driven by an inboard motor of $\frac{1}{2}$–$\frac{3}{4}$ h.p., at a speed of eight knots along a 500-ft. tank, through a series of three-inch waves. This represented to scale the conditions met with in a North Atlantic crossing, and was used to determine the propellor efficiency and speed-keeping qualities of ships in rough weather. This tank has proved too short for tests of sufficient duration, and the plans of a proposed new tank lay-out with a length of 700 feet were shown.

# THE SERVICES

## ROYAL NAVAL MEDICAL SERVICE.

The following appointments are notified: Surg. Lt.-Comdrs. T. C. H. Neil to *Pembroke*, for R.N. Barracks, Chatham; W. Flynn to *Sutton*; J. F. H. Gaussen to R.N. Hospital, Portland; and T. Madill to H.M.H.S. *Maine*.

Surg. Lt. W. A. Hopkins to *Egmont*, for H.M. Dockyard, Malta.

### ROYAL NAVAL VOLUNTEER RESERVE.

The following appointments are notified: Surg. Lt.-Comdr. T. W. Drummond to *Victory*; Proby. Surg. Lts. J. J. Dwyer and G. M. Tanner to *Victory*, for R.N. Hospital, Haslar; Proby. Surg. Sub-Lts. R. H. Berry and S. C. Suggit to *Victory*, for R.N. Hospital, Haslar.

## ROYAL ARMY MEDICAL CORPS.

Lt.-Col. and Bt. Col. (temp. Col.) A. C. H. Gray relinquishes the appt. of Professor at the R.A. Med. Coll.

Lt.-Col. R. R. Lewis retires on retd. pay.

Maj. and Bt. Lt.-Col. (temp. Lt.-Col.) W. C. Smales to be Lt.-Col., vice Lt.-Col. R. R. Lewis.

Maj. T. T. H. Robinson to be temp. Lt.-Col.

Capt. C. V. Macnamara to be Maj. (prov.).

Capt. I. F. MacKenzie relinquishes his temp. commn.

### ARMY DENTAL CORPS.

Capts. H. J. Higgins and A. B. H. Cole to be Majs.

### TERRITORIAL ARMY.

Lt. W. Niven to be Capt.

J. C. McFarland (late Cadet, Liverpool Univ., Sen. Div., O.T.C.) to be Lt.

## ROYAL AIR FORCE.

D. S. Buchanan is granted a commission in the Special Reserve as a Flying Officer.

Flight Lt. G. R. Nodwell is transferred from Class D (ii) to Class D (i).

Flight Lt. W. D. McKeown relinquishes his short service commission on account of ill-health.

## INDIAN MEDICAL SERVICE.

Lt.-Col. J. E. Clements retires.

The undermentioned appts. are made: Chuni Lal Ahluwalia, Gopal Singh, Hira Nand Dewan, Kundan Lal Malhoutra, Shiv Parshad Bhatia, and Promode Kumar Sen Gupta to be Lts. (T.C.).

# THE NEW SURGICAL WING AT ST. BARTHOLOMEW'S HOSPITAL.

By E. Maxwell Fry, B. Arch., A.R.I.B.A.

The plan of the square of St. Bartholomew's Hospital with its four large eighteenth century buildings shutting it in, is probably familiar to most readers of The Lancet. It will, therefore, indicate the position of the new surgical block which is being opened to-day (Friday) by the Lord Mayor of London, to say that it is entered through the centre doorway of the south block, and that when the scheme of reconstruction of the hospital is completed it will consist of a surgical block, a medical block built over and into the south block itself, and a theatre block midway between. At present every operating case has to be taken across the open quadrangle to the existing theatre in all kinds of weather, so that the provision of the new surgical block removes at one blow one of the patent disabilities of the old unhappy arrangements.

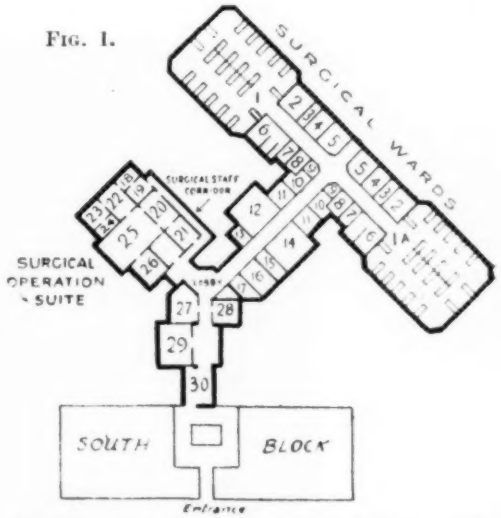
The plan of the new block is governed to a certain extent by the restricted nature of the site, which does not allow of ideal planning. Within these restrictions the architects, Messrs. Lanchester and Lodge, have planned to the utmost limits of enlightened hospital practice, introducing features which even more ideally situated hospitals are without and producing what must be accounted the most scientifically constructed hospital block in the world.

The surgical block is connected on the one side with the nurses' home and on the other with the out-patients and casualty wards, ensuring thereby two essential arterial supplies. With this block running east and west and the south block irremediably fixed in its present position, it will be seen that the theatre block, which should be removed from the wards as an independent unit, is so placed as to lie adjoining the connecting corridor flow, with its large theatre windows facing the steady north light.

Fig. 1 shows the arrangement of one typical floor. There are five of these one above the other, with another floor of laboratories above, and on the roofs a solarium. In the basement will be found the machinery which keeps the services of all kinds in motion, while there is yet another operating theatre for X ray work only.

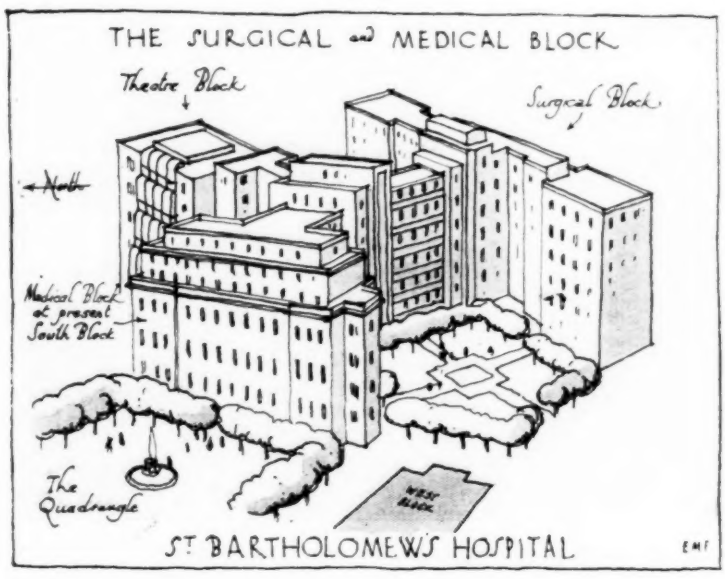
Fig. 2 shows in rough sketch form the appearance of the completed block, and shows why it is necessary to plan a modern hospital not in large single blocks, but in widely deployed wings, cutting in and out as its intention varies, and most important, allowing sun and air to stream uninterruptedly through as many windows as possible. In this connexion it should be remarked that the simple fact of the temperature on one side of a building being slightly lower than on the other is enough to induce cross ventilation without the presence of wind. This natural ventilation is here used to its utmost.

Fig. 1.




(1) Men's ward. (1A) Women's ward. (2) Kitchens. (3) Bath-rooms. (4) One-bed wards. (5) Two-bed wards. (6) Clean "wash-up" rooms. (7) Dirty "wash-up" rooms. (8) Pathological rooms. (9) Patients' clothes rooms. (10) Linen rooms. (11) Sisters' rooms. (12) Special examination and pathological room. (13) Surgeons' laboratory. (14) Bed and main lift. (15) Women's lavatory. (16) Patient's friends waiting room. (17) Men's lavatory. (18) Instrument room. (19) Nurses' dressing room. (20) Surgeons' dressing room. (21) Dressers' and house surgeons' dressing room. (22) Sterilising room. (23) Staircase. (24) Students' observation gallery. (25) Major operation theatre. (26) Anæsthetising room. (27) Visitors' temporary canteen. (28) Temporary dormitory for patients' male friends. (29) Temporary dormitory for patients' female friends. (30) Temporary connecting corridor.

Fig. 2.



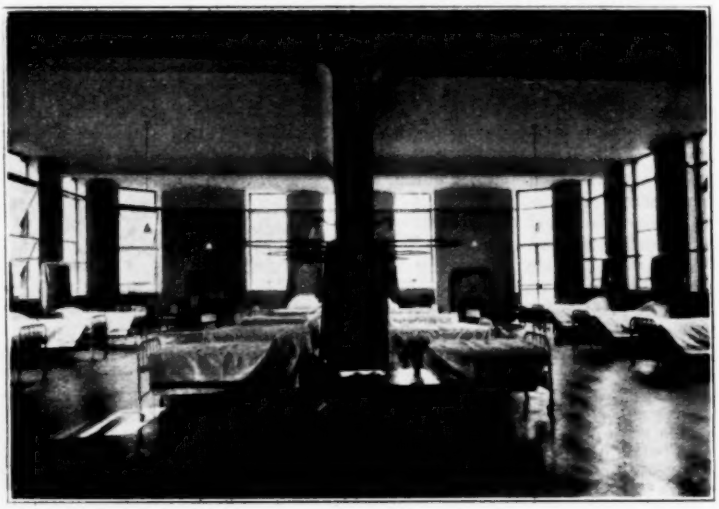

## The Wards.

The wards, each of 22 beds, supplemented by three beds in two small private wards, are on a sort of dumb-bell plan (Fig. 3) with the service rooms on the connecting corridor duplicated for each ward, male and female. In the wards themselves one is surprised at the absence of the institutional atmosphere. What was chilling in the old hospital plan has been eliminated. The ward is wide instead of long and has a central partition which allows of a regular but not monotonous disposition of beds. Heating is on the panel system and no pipes are visible, but there are two large gas stoves

on the end wall of the wards as a concession to that desire for radiant heat that will keep breaking through our zeal for scientific heating. Open fires might have done even more to promote the feeling of comfort, but they demand extra service.

Each bed is equipped with a care for the physical and mental comfort of the occupant. Wireless, of course, is laid on, and an individual electric light switch, an all-enveloping private curtain, a combination stool for books, brushes, and personal belongings provide sympathetic units of bedside organisation, supplemented by a little stool for visitors that just slides under the bed. The power plug and suction plant point are in another category that will be described later. The glass-faced poison cupboard is the only cupboard in the ward.

FIG. 3.



One of the new wards (the Waring Ward).

### THE WARD SERVICES.

The corridor that joins ward to ward carries a complete local service. On one side are, in order, kitchen, bathroom, one-bed and two-bed wards; on the other, clean and dirty "wash-ups," a room for pathological investigations, a patient's clothes room with lockers, and a linen room. The kitchen and clean "wash-up" lead directly from the wards, the remainder opening from the corridor. The small kitchen has an electric refrigerator beside a gas stove of unusual design, including boiling and heating ovens with a little gas stove for cheer. The bath in the bathroom stands free, so that it may be entered from either side. In the dirty "wash-up" are found the controls of the "suction" plant referred to in the description of the ward. This humane and ingenious device replaces the clumsy swabbing and clearing of wounds by a small suction nozzle that does the same work with greater ease and rapidity, carrying the pus and blood away from the bedside at once. The instrument has also other uses for the visiting surgeon.

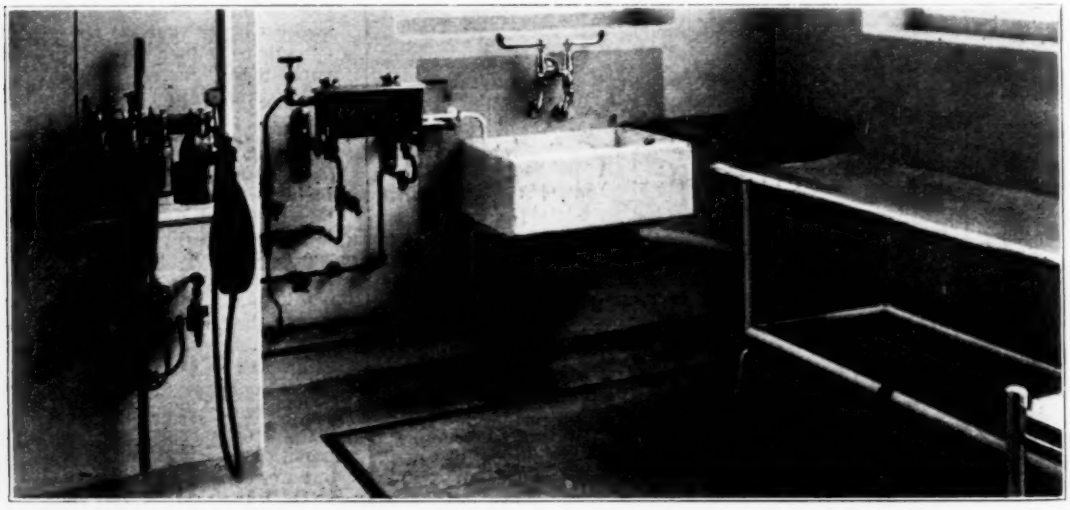
It might be well here to describe the system of one-way lifts that ensure that dirty dressings go down without coming in contact with clean dressings, which come up by another route. In the dirty "wash-ups" bed-pans are stacked on a coil of hot pipes so as to be warmed ready for use if required.

A corridor leading at right angles from the surgical ward block joins the entrance lobby to the theatre block before proceeding to the proposed medical block (as yet unbuilt). On this corridor is found the sisters' room, rather too close to the dirty "wash-up," though this is perhaps unavoidable. On the same side is the main staircase and lift-well, well-equipped rest rooms for visitors waiting to see friends, and lavatories. On the opposite side is the special examination and pathological room, equipped for certain laboratory work and classes.

## The Theatre Block.

The design of modern operating-theatre units is a process of exact thinking and stringent elimination of non-essentials. If it achieves beauty it does so because elimination produces simple surfaces, new textures, and abundance of light. In this it moves with the trend of modern design. This theatre block is the most advanced of its kind. The intention

FIG. 5.



A corner of an anæsthetising room, showing apparatus through which anæsthetics are led to each floor by pipes from the basement.

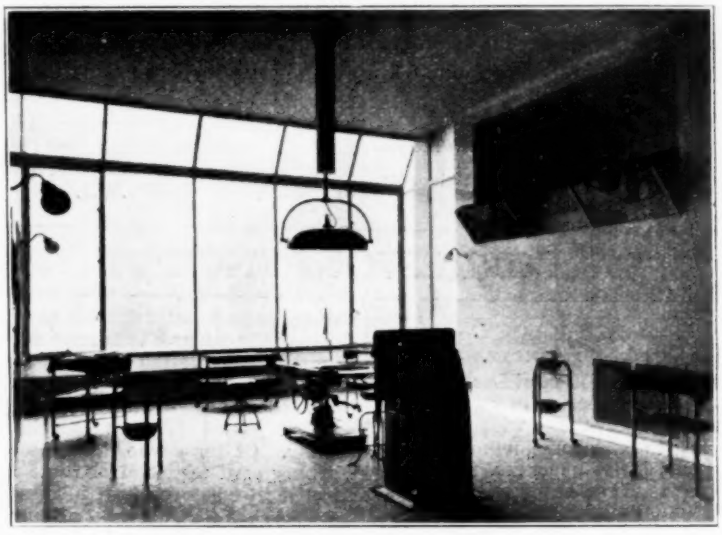
is to bring into the operating theatre only surgeons and nurses who are already washed-up, instruments which are already sterile, and a patient already prepared for operation. Provision is made that incoming and outgoing cases do not meet, and that students may view the operations without setting foot in the theatre.

The whole plan is thus a system of circulation leading to and from the theatre. To achieve this the nearest approach to the theatre is by way of the anæsthetising room (Fig. 5), whence the patient enters. The nurses and surgeons take a longer way round, entering the theatre by a little passage that serves first the dressers and house surgeons' dressing-room, then the surgeons' dressing-room, and finally the nurses' dressing-room, through which is reached the sterilising room. Each party to the operation is thus enabled to change and prepare for the work before reaching the theatre, without loss of time. The circulation is completed by a separate exit for patients.

In one corner is a staircase leading to the spectators' gallery, with a one-way opening door leading from the sterilising room.

The photograph (Fig. 4) of the theatre shows clearly the great north-light window, the operating-table, and anæsthetics column, supplied with a complement of four anæsthetic supplies, beside other equipment. To the right is the gallery for students with glass shield.

FIG. 4.



One of the theatres, showing screened gallery for students, and in foreground, an anæsthetics column which contains also controls and plugs for all electrical apparatus.

#### FITTINGS, FINISHES, AND MATERIALS.

The washing sinks, constructed with concave walls so as to minimise splashing, with cantilever brackets leaving clear space under them; and "elbow" taps in chromium-plated metal, are models of sane sanitation. A warning light replaces the bell signal here as elsewhere. These signal lights are a feature both of the wards, where they are used to warn particular surgeons of calls in other parts of the building, and of the corridors, where they are fixed over the doors of the small wards to which they are connected. Metal windows are used. The ward windows are large, open at a touch, and open to their full extent. They will also open at the top only for a minimum ventilation.

Hard cements and hard enamels are used in the internal work. In the wards and corridors light entering through the windows is reflected again and again from glossy surfaces until it performs five times its normal function.

The use of materials—not always new, but new in their application—produces a style of architecture where light engenders an atmosphere in which it should be a joy to work, and less of a burden to cure.

Bart.'s is being rebuilt essentially in the atmosphere of our time at one with the architecture of the tubes, of great liners, of aeroplanes, and of all modern works which are stamped with the avid, logical subjugation of matter by reason.

It must have become increasingly evident to the governors that nothing short of a reconstruction of the entire mechanism of the structure would restore the balance of part with part so as to allow the varied work to flow smoothly in and about the whole, and the new surgical block which is but part of a larger block, about which the reconstruction of the hospital is to be grouped. Many of the older blocks are to remain very much as they are; others are to be reorganised internally, while some others again will be demolished and their sites filled with new buildings.

## BRITISH POST-GRADUATE HOSPITAL AND MEDICAL SCHOOL.

THE Minister of Health, Mr. Arthur Greenwood, has appointed a Provisional Organisation Committee for the new British Post-graduate Hospital and Medical School.[1] The committee is to report upon (1) the action requisite to lead up to the planning and construction of the medical school, and (2) the form of government appropriate to the hospital and medical school, with special reference to the position of the London County Council as the local authority responsible for the hospital, and to the position of the University of London in relation to the Medical School.

The Chairman is Viscount Chelmsford; the Ministry of Health will be represented by Sir George Newman, Chief Medical Officer, and Mr. Heseltine, as assistant secretary; and the London County Council will be represented by Miss F. Barrie Lambert, M.B., Sir William Ray, Mr. Angus N. Scott, and Mr. L. Silkin.

The representatives of London University will be the Rev. J. Scott Lidgett, the Vice-Chancellor-elect; Mr. S. L. Loney, the Chairman of Convocation and Deputy Chairman of the Court; Mr. H. L. Eason, Superintendent and Senior Ophthalmic Surgeon, Guy's Hospital; and Mr. Edwin Deller, the Principal.

The other members of the Committee are:—

Mr. Donald J. Armour, Senior Surgeon, West London Hospital.

[1] See THE LANCET, 1930, i., 869 and 881.

Lady Barrett, M.S., Dean of the London (Royal Free Hospital) School of Medicine for Women.
Mr. Comyns Berkeley, Surgeon, Middlesex Hospital, and a member of the Radium Commission.
Sir Robert Bolam, Honorary Physician, Royal Victoria Infirmary, Newcastle-on-Tyne, and past Chairman of Council, British Medical Association.
Dr. H. B. Brackenbury, Chairman of Council, British Medical Association.
Mr. H. W. Carson, Senior Surgeon, Prince of Wales's General Hospital, Tottenham.
Dr. H. G. Dain, Chairman of Insurance Acts Committee, British Medical Association.
Lord Dawson, Physician in Ordinary to the King, and Physician, London Hospital.
Prof. H. R. Dean, Professor of Pathology, Cambridge University.
Sir Walter M. Fletcher, F.R.S., Secretary of the Medical Research Council.
Prof. G. E. Gask, Professor of Surgery, London University, and a member of the Radium Commission.
Sir Thomas Horder, Physician in Ordinary to the Prince of Wales, and Physician, St. Bartholomew's Hospital.
Dr. F. N. Kay Menzies, Medical Officer of Health for the County of London.
Lord Moynihan, President of the Royal College of Surgeons; Consulting Surgeon, Leeds General Infirmary, and Emeritus Professor of Surgery, Leeds University.
Mr. H. J. Paterson, Senior Surgeon, London Temperance Hospital, and Honorary Secretary, Fellowship of Medicine and Post-Graduate Association.
Dr. Harold Pritchard, Physician, West London Hospital.
Sir Holburt J. Waring, Surgeon, St. Bartholomew's Hospital.

Mr. Heseltine will act as secretary of the committee, and all communications on the business of the committee should be addressed to him at the Ministry of Health, Whitehall, S.W.1.

# CORRESPONDENCE

## AVERTIN IN LARYNGOLOGY.

*To the Editor of* THE LANCET.

SIR,—In the report of the Section of Laryngology, Royal Society of Medicine, appearing in THE LANCET of June 28th, there are observations with regard to avertin on which I beg to offer some comment. It was stated, for example, by one speaker, that "the state of unconsciousness for two hours and sleepiness for three days was, especially in laryngeal conditions, something strenuously to be avoided. The absence of laryngeal reaction in these patients after the use of avertin was very alarming." These remarks were called forth and no doubt justified by the preceding statements of others which unfortunately are not recorded, but I would like to point out that those observations do not apply to the usual effects of avertin when correctly used. When so employed it has never to my knowledge caused sleepiness for three days, and what is more important, the laryngeal reactions return, if they are ever abolished, within a short space of time. This is secured by giving avertin without any preceding opiate or similar drug. I think it would be a pity if the use of avertin, which I have seen to be of enormous benefit to suitable patients undergoing operations on the throat, were to be avoided because of a fear which is really not well founded.

I am, Sir, yours faithfully,

London, June 30th, 1930. J. BLOMFIELD.

## COLOUR VISION TESTS.

*To the Editor of* THE LANCET.

SIR,—In an annotation on p. 1360 (June 21st) you dealt with the international standardisation of colour vision tests. The two essentials of a practical test for colour-blindness are that dangerously colour-blind persons only should be rejected by it and that no dangerously colour-blind person should escape detection. The wool test with five test colours allows 50 per cent. of dangerously colour-blind to escape detection and of those rejected by it 50 per cent. are practically normal-sighted. The pseudo-isochromatic tests in common use are those of Stilling, Ishihara, and my card test. In order to ascertain the relative merits of these three tests, 38 consecutive, referred or appeal cases were examined at the Board of Trade with the following results. None of these cases was examined by me alone; at least three persons and often more were present at all the examinations. In every case Capt. Ellery or Capt. Dowdy and the recorder were present. Each candidate was first examined by the pseudo-isochromatic tests and the fact whether he was dangerously colour-blind or not was ascertained subsequently. Ten of the 38 cases were passed and 28 rejected. Of the 28 who were failed 16 failed with all three pseudo-isochromatic tests, but 12 of those rejected passed Ishihara completely and 11 passed Stilling. Of those who were passed 7 showed defects with my card test, and of those who failed all were rejected by my card test, in most cases failing very badly, as for instance not reading card 8, a yellow-green C on an orange ground. The explanation of the difference is that a test for a dichromic will not necessarily detect a trichromic who has three colour sensations red, green, and violet but no yellow sensation, and who is obviously dangerous as shown by the examination with the lantern and spectral tests. In my card test also the pattern is the same on every card, so that the examinee has to judge by colour alone and cannot follow the design of the artist.

An important point to note is that a test which is difficult to the normal-sighted is not necessarily difficult to the colour-blind. This is shown by the number of colour-blind persons who can read Stilling's plates numbered 9 and 10, the reading of which is supposed to indicate very good colour perception. In fact, a test may be constructed which can be read by the colour-blind but not by the normal-sighted. Nagel's anomaloscope is not a satisfactory test as a man may be anomalous without being colour-blind and 90 per cent. of the colour-blind agree with the normal equation.

I am, Sir, yours faithfully,

F. W. EDRIDGE-GREEN.

Board of Trade, S.W., June 28th, 1930.

## SUSCEPTIBILITY TO HAY-FEVER.

*To the Editor of* THE LANCET.

SIR,—There is some evidence that susceptibility to hay-fever is hereditary. It is also a character usually well marked and comparatively easy to trace amongst members of a family. At this time of the year many general practitioners must meet with hay-fever cases whose genetical history could be discovered without much difficulty. Should any of your readers come across such cases and be willing to obtain records of the incidence of hay-fever amongst members of the family over (say) four generations, I should be glad to receive them as I am collecting records of this kind.

I am, Sir, yours faithfully,

H. G. THORNTON.

Bacteriology Department, Rothamsted Experimental Station, Harpenden, June 27th, 1930.

## NOISE IN HARLEY STREET.

*To the Editor of* THE LANCET.

SIR,—As a fellow sufferer I should like to endorse Mr. Ralph Thompson's protest against the persistent din—"noise" is too mild a word—which has afflicted us in this neighbourhood for several weeks past. From the slowness with which the work of building the London Clinic proceeds it is to be feared that we may be subjected to this nuisance for a long time yet. There are noises which are endurable and there are noises which are not. But for this fact I should not write to you, since we cannot expect even a building having so beneficent an intent as a nursing home to be erected like the Jewish temple—noiselessly. The noise that is intolerable is the riveting of the steel girders—sudden, piercing, echoing, and altogether devastating. Friends with knowledge of architecture and building tell me that this exasperating noise could be avoided by the use of special drills, though this would involve an extra expenditure in the cost of the nursing home. May we venture to hope that those concerned will consider it a good investment to incur this additional outlay in exchange for our sympathetic support in the future? I am, Sir, yours faithfully,

Harley-street, W., July 1st, 1930. THOMAS HORDER.

*To the Editor of* THE LANCET.

SIR,—Could I be allowed to join in with the protest against the hideous noise at the north end of Harley-street? Apart from the almost impossibility of using any sort of instrument or telephone, the constant din is most bewildering and quite inhibits any concentration. I am, Sir, yours faithfully,

Harley-street, June 28th. HORACE HILL, M.R.C.P.

## A MANUAL OF FEVERS IN INDIA.

*To the Editor of* THE LANCET.

SIR,—In your issue of April 26th (p. 939) appeared a letter from Dr. P. T. Patel about the review of his book on infectious diseases (THE LANCET, Jan. 25th, p. 192). Your views, I may say, are shared by most public health authorities out here. Dr. Patel's fear of the introduction of yellow fever is out of date. The old, old bogy about the Panama Canal was drummed into us 20 years ago, and the risk of infection through the Canal Zone is remote in comparison with that of cases imported from Africa to India. Though the risk of yellow fever coming to India along the Imperial Airways route cannot be altogether excluded, Karachi and not Bombay would be the first to get infected.

I am, Sir, yours faithfully,

June 6th, 1930. INDO-MEDICUS.

# PARLIAMENTARY INTELLIGENCE

## NOTES ON CURRENT TOPICS.

### COLONIAL HEALTH SERVICES.

ON Thursday, June 26th, the House went into Committee of Supply on the Civil Estimates. Mr. DUNNICO, Deputy Chairman of Committees, was in the chair.

On a vote of £98,306 for the salaries and expenses of the Department of the Secretary of State for the Colonies,

Miss PICTON-TURBERVILL called attention to the question of mui-tsai in the Crown Colony of Hong-Kong, a system under which, she said, little girls from 7 and 8 years of age upwards were deliberately sold for certain sums of money. Such a system, she urged, ought not to exist any longer under the British flag. The hon. Member also drew attention to the practice in the same Colony of selling young girls in connexion with the system of tolerated houses. One way of dealing with this question was to abolish tolerated houses, and she wished to know whether the matter was to be raised at the forthcoming Imperial Conference.

#### EDUCATION AND MEDICINE.

Mr. HORRABIN raised the question of education in the African Colonies. He said that he wished to emphasise the very strong appeal made recently for the closer relationship between the medical service and the educational machine. It had been remarked that the Board of Education in this country had become more and more a Ministry of Health through the medical examination of children in the schools. That ought to be the case in Africa, where questions of health, hygiene, and sanitation were so much more important. Out of every 1000 babies born in almost every tribe in Kenya, rather more than 400 died every year. He believed that that was a very low estimate.

Miss RATHBONE said that it was hard to see how the requisite changes in administration could be carried out in Africa if the expenditure upon natives was to be bounded and limited by the amount of taxation collected from the natives. Money in matters of social reform was the root of all progress. Indeed, the amount of progress that could be accomplished in health and in education would be the measure of the financial resources available for the purpose. From many workers who had spent years in doing painstaking work for the education and health services of women in Africa she had heard complaints of tiny grants capriciously given, frequently lowered or withdrawn without any particular reason, often in accordance with the demands of economy or because of some anonymous complaint or because money must be made available for some institution in which an administrator was interested. On the health side one heard of great tracts of Africa where hospitals were either non-existent or where they had no female staff, being staffed entirely by men and native boys. This state of things existed although there was an appallingly high infantile and maternal mortality.

Mr. ERNEST WINTERTON said that in 1888 the House of Commons passed a resolution cordially supporting the Imperial and Colonial Governments in their endeavour to suppress the traffic in spirituous liquors in the territories under their influence and control. There had been an increasing sale of spirits in certain parts of the Crown Colonies, which was causing the gravest distress and concern to many people in this country, whether they were associated with the temperance cause or not. They were filled with grave concern at the unsatisfactory nature of the replies so far given, and although they acknowledged that there had been some slight improvement in West Africa and on the Gold Coast during the last two years, there was still much to be done to redeem the established declaration of the House of Commons that the right thing to do was to prohibit the liquor traffic as regarded the native races.

#### AFRICAN WOMEN.

Dr. DRUMMOND SHIELS (Parliamentary Secretary for the Colonies), replying to the debate, said that the position of women in Africa, maternity and child-welfare, and so on, was the subject of earnest consideration by the Colonial Office, and the existence

of the Colonial Development Fund had given them some encouragement. The terms of reference of the Fund were broadly drawn, and it had been found possible to include in the schemes towards which assistance could be given schemes to develop and assist public health services. A Committee of the Colonial Office had just been sitting to devise the lines along which such assistance should be given, and he was certain that before long they would get very substantial assistance from this Fund for various Colonies which were not very well off. There was no doubt that they had been hampered, especially in certain Colonies, such as Nyassaland, because of the parsimony of the Treasury. But they were now hopeful that in Nyassaland and other parts they might be able with the help of the Colonial Development Fund, not only to assist in public health, but also in the training of subordinate medical personnel, and of midwives, and in other ways to meet the very real need to which hon. Members had called attention. Referring to the question of mui-tsai in Hong-Kong, Dr. Shiels said that last December new regulations were put into force for the registration of employers, and six months were given for the change to be brought about. In July they expected to find out the result of the alteration. It must be remembered that the task of dealing with this question was very difficult. Hong-Kong was a typically Chinese town, in very close association with the mainland, and it was difficult to carry out many of these regulations which were regarded as desirable, but no more mui-tsai were allowed to be brought in, and every effort was being made to carry out the decision which had been made. At the same time there was a difference of opinion, even among British people, as to whether all the results which had been expected from the abolition of mui-tsai would be realised. There was no doubt that there were some disadvantages in the girls being reduced to the status of domestic servants without the protection which they had under the present system. However, it had been agreed that in spite of these disadvantages an effort should be made to get rid of the system. The Chinese authorities had seriously meant to put a stop to the practice of mui-tsai throughout China, but the disturbed state of the country had made those efforts largely ineffective. The policy of the Government was to get rid altogether of the tolerated houses in Hong-Kong.

The debate on the vote was adjourned.

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## HOUSING AND SLUM CLEARANCE.

ON Monday, June 30th, the House went into Committee of Supply on the Civil Estimates, Mr. R. YOUNG, chairman of committees, in the chair.

On a vote of £12,724,200 for the salaries and expenses of the Ministry of Health,

### LACK OF STATE ASSISTANCE

Sir KINGSLEY WOOD moved to reduce the vote by £100. He said that since they had been in office the Labour Government had succeeded in depriving thousands of families in England and Wales of new houses which might have been in existence to-day. There had not been even sufficient State-assisted houses built to meet the ordinary growth of the population and to replace the wastage of old buildings, and if it had not been for private enterprise the housing shortage in the past year would not have been reduced. An army of over 100,000 building operatives walked the streets looking for work in building houses which in many quarters were badly needed, rents had not been reduced, the slums still remained, and the replanning of town and country had made no adequate advance. This was due to the weak, hesitating, and doubtful policy of the Minister of Health.

Mr. E. D. SIMON said that the Ministry of Health was such an overgrown organisation that no Minister could be expected to have very much time to think about these pressing problems. But housing was by far the most important task which the right hon. gentleman had to face, and he believed that it had been very seriously neglected in recent months. He believed that Members in all parts of the House would support the Government in taking some measures to get back from the miserable figure of 50,000 to something approaching the goal they had set before them of 225,000 assisted houses a year.

Miss LEE appealed to the Minister to tackle the problem of rent. She knew that the Government were trying to do it in the Slum Clearance Bill, but there was also the problem of the rents of houses already built. It was no use going on building more houses at rentals which people could not afford to pay.

### PROVISION OF THE CHEAP HOUSE.

Sir TUDOR WALTERS said he thought that the real reason why house-building was slackening off was that of the kind of house they had been laying themselves out to build in the last few years—namely, houses of the standard of the Tudor Walters Report, the supply had almost reached the demand. The question of supreme importance now was the provision of the cheap house, the housing of the slum dwellers, the casual workers, and the poorly paid members of the community. But if cheap houses were to be built they must be good houses, and not insanitary huts or hovels, or houses which would degenerate into slums. Such houses must be built on a large scale and they must organise and control the method of building and the supply of materials, and take care that there was no exploitation. They must survey the housing requirements of the whole country and include in their purview slum clearance, the provision of cheap houses to replace slums, and the provision of rural houses at rents which the rural workers could pay. There should be a National Housing Board with four or five men on it who understood the question and would insist upon something being done.

Dr. DAVIES said that of all the failures of the Government the most colossal was their failure in regard to housing. They had expected better results from Mr. Greenwood, who was no novice in this matter, having served as Parliamentary Secretary under the late Mr. Wheatley when he was Minister of Health. But after 12 months of office of the present Government the country was faced with a shocking state of affairs. Why had the Minister of Health not asked Mr. Thomas, when he was Lord Privy Seal, to devote some of the money voted by the House for the relief of unemployment, to assist in the progress of housing? One of the great difficulties which faced local authorities at the present time in regard to housing development was that they were not prepared to take upon themselves fresh financial responsibilities.

### MINISTERIAL REPLY.

After further debate,

Miss LAWRENCE (Parliamentary Secretary to the Ministry of Health) said that by every test it was possible to apply it could be proved that this year was much better than last year as far as housing results were concerned. The total number of houses built by local authorities was up, and so was the number built by private enterprise. The total number of houses built between March, 1928, and March, 1929, was 169,532, and no fewer than 201,812 houses had been built this year—i.e., up to March last. As a matter of administration the Government had advised local authorities to hold their hands for slum clearance until the new Housing Bill had passed through the House. They had done so because the authorities under the new procedure would be safer, secondly because the procedure would be quicker, and thirdly because the authorities would be receiving more money. Those were good and sound reasons.

The motion to reduce the vote was negatived by 229 votes to 148.

## HOUSE OF COMMONS.

WEDNESDAY, JUNE 25TH.

### Fatal Street Accidents in London.

Mr. DAY asked the Minister of Transport whether, in view of the increase in the number of fatal accidents in London during the previous 12 months, what action his department or the London Traffic Advisory Committee were taking to prevent the increase of such accidents in the future; and if he had received any recent reports from the London Traffic Advisory Committee on the subject.—Mr. H. MORRISON replied: My Department, as well as the London Traffic Advisory Committee, are continuously engaged on the consideration of proposals designed to improve the conditions of the streets in London from the point of view of safety, and I am always prepared to consider any such proposals which may be submitted by the local authorities. Two reports of the committee were issued last year on this subject, and were discussed with representatives of all local authorities in the area, and with the associations and societies interested. I hope to be in a position to publish the conclusions reached at the conference at an early date.

### Hospital Charges to Air Personnel in Iraq.

Sir GEORGE BOWYER asked the Under Secretary of State for Air whether he was aware that members of the Royal Air Force in Iraq, while in hospital, were deprived of their Colonial allowance, and had to pay 2*s*. 6*d*. a day as a hospital charge, thus undergoing a total loss of 11*s*. 6*d*. a day; and whether he would see that this Colonial allowance was restarted forthwith.—Mr. MONTAGUE replied: My noble friend is aware of the facts stated by the hon. and gallant Member, but he does not see his way to alter the regulations upon this subject. The charge of 2*s*. 6*d*. a day is the normal hospital stoppage for officers, and the issue of Colonial allowance is also properly suspended since it is not an ordinary emolument but an additional allowance granted solely to meet the extra cost of living in a command abroad as compared with the cost at home. When an officer is in hospital and is not subject to the additional expenses which the allowance is intended to cover, its continued issue is clearly not justified.

Sir G. BOWYER: Will the hon. gentleman call for a report on this matter from Iraq, and thus learn of the great difficulties and distress of feeling which there is in that country upon this subject at this time?

Mr. MONTAGUE: I would point out that there is no marriage rate in Iraq at all. The marriage state is not recognised in that respect there.

### Cream Regulations in Scotland.

Dr. HUNTER asked the Secretary of State for Scotland if he had made any decision in connexion with the request from a deputation representing the creamery proprietors and wholesale dairymen throughout the country to rescind or amend the Cream Preservative Order.—Mr. JOHNSTON replied: After careful consideration of all the medical and other evidence available and after consultation with my right hon. friend, the Minister of Health, the Secretary of State regrets that he cannot see his way to authorise the withdrawal or amendment of the provisions of the Preservatives Regulations relating to cream.

### Mosquitoes and Public Health.

Sir WILLIAM DAVISON asked the Minister of Health whether his attention had been called to the continued increase in the number of mosquitoes in this country; and what action was being taken to combat this menace to the national health.—Miss LAWRENCE (Parliamentary Secretary to the Ministry of Health) replied: My right hon. friend is advised that the number of mosquitoes in this country fluctuates from year to year, according to the climatic conditions, but does not show any general increase. In the present year some species (especially the sylvan species) are unusually prevalent. My Department, in collaboration with the British Museum (Natural History), has given attention to this matter for some years past, and a pamphlet on British Mosquitoes and their Control has been published, which contains advice on the best methods of combating mosquito pests. My Department is also prepared on request to advise local authorities on the matter.

THURSDAY, JUNE 26TH.

### Medico-Psychological Departmental Hospitals.

Mr. OLIVER BALDWIN asked the Minister of Health if he would consider the setting up of a medico-psychological department to mental asylums, both criminal and non-criminal, in order to attempt the effecting of cures.—Mr. GREENWOOD replied: I cannot undertake to consider this suggestion without a more precise indication of the constitution and functions of the proposed department, and of the necessity for its establishment, having regard to the medical services already available in mental hospitals. I would remind my hon. friend that criminal lunatic asylums are within the jurisdiction of the Home Secretary, and any question in regard to them should be addressed to him.

### Smoke Abatement.

Sir NICHOLAS GRATTON-DOYLE asked the Minister of Health what number of local authorities had adopted by-laws on the subject of smoke abatement; what number had no by-laws; and whether it was proposed to take any steps to extend the adoption of such by-laws.—Mr. GREENWOOD replied: 116 local authorities have made by-laws. Although this leaves 1652 without by-laws, the districts without by-laws are largely those where few or no manufacturing processes are found, and many of them are rural. In view of this, and of the powers of proceeding for proved nuisance even without by-laws, I do not think it necessary at present to exercise the power given me by the Act of 1926 of forcing local authorities to make by-laws.

Sir N. GRATTAN-DOYLE: Will the right hon. gentleman bear in mind that this question of smoke abatement is of very vital interest to the public health, and will he not try to ginger up the local authorities so that they will do a little more than they have done?

Mr. GREENWOOD: I am very anxious to encourage local authorities but the process of gingering up is one to which there is a limit.

### Midwives Administration.

Capt. EDEN asked the Minister of Health his reasons for refusing to make an order under Section 62 of the Local Government Act, 1929, directing that the borough council of Leamington should become the local supervising authority for the district under the Midwives Acts, 1902 to 1926.—Mr. GREENWOOD replied: I have already informed the borough council that I do not consider it desirable that a separate organisation should be set up for the supervision of midwives in an area in which the number of practising midwives is so small as in this case.

Capt. EDEN: Is the right hon. gentleman aware that this decision is strongly resented by the local authority, and will he indicate the place in the Act where he finds the words on which he has based his decision?

Mr. GREENWOOD: I have not the Act by me, but it was clearly contemplated by the late Government that the powers should only be used in an area where there were a sufficient number of midwives to justify a separate organisation.

Sir KINGSLEY WOOD: I take it that the right hon. gentleman is willing to follow the late Government?

Mr. GREENWOOD: I would not say that, but I must administer the law as it stands.

Capt. EDEN: Does the right hon. gentleman suggest that the local authority is not capable of exercising these powers, and since these words do not occur in the Act, will he reconsider his decision?

Mr. GREENWOOD: As a matter of fact it really is a question of local efficiency, and where the number of midwives in an area is very small, it is clearly advantageous that the administration of the Act should be in the hands of the larger authority.

### Defective Children.

Mr. FOOT asked the President of the Board of Education the number of children in England and Wales under the age of 14 for whom, owing to their blindness or other physical disability, no educational provision was at present being made.—Sir C. TREVELYAN replied: The returns furnished by local authorities show that on Dec. 31st, 1929, the number of blind children in England and Wales, under the age of 16, not attending any school or institution was 557; that the corresponding number of deaf children was 305; and of cripples 5461. The returns do not show how many of these children were under the age of 14. It must not be inferred that there is a need for further special school provision to the extent indicated by these figures, as they include some children under the age of compulsory school attendance, and some children prevented by temporary difficulties from attending special schools.

Mr. FOOT: Is the right hon. gentleman satisfied that the number of these children deprived of education is being satisfactorily reduced year by year?

Sir C. TREVELYAN: I am satisfied that the position is getting better, and that there is no special need for increased accommodation.

### Private Asylums.

Mr. MACLEAN asked the Minister of Health whether any conditions were imposed upon the licensee of a private asylum as to the conditions under which patients were kept, and the financial charges made while in the keeping of such asylums; and whether he proposed to take power to compel the licensees to submit their accounts to a Government Department for examination.—Mr. GREENWOOD replied: The conditions under which patients are treated in private

institutions are examined by the Visiting Commissioners of the Board of Control who have a duty to inquire among other things as to the fees paid. The Commissioners satisfy themselves that the fees paid are generally reasonable for the accommodation and treatment supplied. The answer to the last part of the question is in the negative.

### Bathing Accidents in the Serpentine.

Sir NAIRNE STEWART SANDEMAN asked the First Commissioner of Works whether, in view of the accidents which had occurred recently to bathers in the Serpentine, he would provide a larger measure of supervision than hitherto.

Mr. DAY asked the First Commissioner of Works whether any additional police had been detailed for duty during the mixed bathing sessions on the Serpentine, Hyde Park.—Mr. LANSBURY replied: Police duties in the Park have been rearranged so as to enable two additional male officers to be on duty at the bathing place in the morning, and two in the evening with a policewoman. As to supervision generally, I am satisfied that the present arrangements are quite adequate.

### Insanitary Houses in Paddington.

Miss RATHBONE asked the hon. Member representing the Ecclesiastical Commissioners whether his attention had been drawn to the conditions of insanitation and overcrowding, as revealed by the reports of the medical officer of the borough of Paddington, in certain properties in that borough owned by the Ecclesiastical Commissioners; and whether the Commissioners were taking any steps to put their property into the same condition of repair as some other properties under their direct control.—Mr. MIDDLETON replied: The Ecclesiastical Commissioners have not been notified of any report of the medical officer of the borough of Paddington. If they receive notification they will carefully consider what obligations may be imposed upon them by the facts disclosed.

MONDAY, JUNE 30TH.

### Lunacy and Divorce.

Mr. HOLFORD KNIGHT asked the Prime Minister whether he had received a memorial, signed by 70 Members of the House of Commons, praying for facilities for the Bill to make certified lunacy of five years and upwards a ground for divorce; whether he was aware that there was a national demand for this reform in the divorce law; and whether he could see his way to grant facilities for the further stages of this one-clause Bill.—Mr. MACDONALD replied: Yes, Sir. As I have already informed my hon. friend by letter, in the present state of Parliamentary business I regret that it is not possible to grant facilities for the Bill referred to.

TUESDAY, JULY 1ST.

### Miners and Nystagmus.

Miss LEE asked the Secretary for Mines if he was aware of the inadequate provision made for miners suffering from nystagmus; what steps had been taken since June, 1929, to improve their position; and what measures, if any, were at present under consideration by his department.—Mr. E. SHINWELL replied: Miners suffering from nystagmus are in the same position under the Workmen's Compensation Acts as workmen disabled by accident or other industrial disease. At the same time I am aware of the difficulties to which they are exposed in obtaining re-employment, particularly in the present condition of the industry, and my Department are still considering with the Home Office what steps might be taken to help them in this respect. Clearly the best remedy would be to diminish the incidence of the disease, and investigations with that object are in progress. Whilst medical opinion is by no means unanimous, it is generally agreed that defective light is a contributing factor, and it is satisfactory to note that, with the encouragement of my Department, improved lamps are being introduced at many collieries.

### Children and Health Insurance.

Mr. HORE-BELISHA asked the Minister of Health whether his attention had been drawn to a recommendation of the medical officer for Plymouth, in his recent annual report on the health of the city of Plymouth, that children of 15 should immediately become insurable so that their school medical records could be passed to panel doctors and so avoid the present year's gap in health supervision; and whether he proposed to take any steps in the matter.—Mr. HAYES (Vice-Chamberlain of the Household) replied: In the event of provision being made by legislation whereby the minimum age for entry into insurance would coincide with the normal school-leaving age, the question of the transfer of the relevant medical records will receive consideration.

### Supply of Quinine in India.

Major GRAHAM POLE asked the Secretary of State for India what progress had been made in the consultations between the Government of India and the Provincial Governments on the question of centralising the whole subject of cinchona cultivation, and the manufacture and distribution of quinine, as suggested by the Royal Commission on Agriculture in India, as a first step towards the reduction of the price of quinine in India to a level at which it would be possible to embark on an extensive anti-malaria campaign.—Mr. WEDGWOOD BENN replied: I have no information later than that given on page 14 of Part I. of the Report on the progress made in giving effect to the Royal Commission's recommendations, a copy of which is in the Library of the House.

### The Eight Hours Convention.

Sir KINGSLEY WOOD asked the Minister of Labour whether she could make a statement as to the policy of the Government at the recent conference at Geneva in relation to the suggested revision of the Eight Hours Convention.—Miss BONDFIELD replied: At the meeting of the Governing Body of the International Labour Organisation at which this subject was raised, the representatives of the British Government abstained from voting.

### Medical Report on "Red Biddy."

Mr. MCELWEE asked the Secretary of State for Scotland whether the report on "red biddy" was available; and, if not, if he could announce a date when it would be.—Mr. ADAMSON replied: I have received a report from the chief medical officer of the Department of Health for Scotland of which I am sending a copy to the hon. Member.

### National Maternity Service.

Mr. FREEMAN asked the Secretary to the Treasury the approximate cost of providing a national maternity service covering the services of a doctor, midwife, and anæsthetic administration.—Mr. GREENWOOD replied: The data required for framing even an approximate estimate of the cost of a service of this kind are not yet available.

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REBUILDING OF THE MIDDLESEX HOSPITAL. — The court of governors met on June 24th for the last time in the eighteenth century board room. The old furniture has been stored, and Prince Arthur of Connaught, the chairman, said that the contract for the demolition of the last portion of the old building has been signed, and that of the total sum of £1,100,000 needed for rebuilding only £300,000 remains to be raised.

THE LONDON HOSPITAL.—Lieut.-Colonel W. M. Pryor presided at the annual prize-giving of the London Hospital Medical College and Dental School on June 24th. Prof. William Wright, the Dean, in presenting the annual report, referred to the death of Mr. Thomas Openshaw, consulting surgeon, and Mr. F. A. Hocking, pharmacist, to the hospital. During the past year Dr. Leonard Hill, F.R.S., had received a knighthood, Mr. A. J. Walton had been appointed honorary surgeon to H.M. Household, Mr. A. G. Elliott, the house governor, had been made O.B.E., and Dr. Robert Hutchison had been elected senior censor of the Royal College of Physicians. Mr. Evelyn Sprawson had been awarded the Tomes prize of the Royal College of Surgeons, Dr. F. B. Byrom had been granted a Rockefeller Fellowship, and Mr. A. Birnbaum had scored a notable academic success by winning the Dunn exhibitions in both anatomy and physiology in the March examinations of the University of London. Among contributions made to medicine from the hospital during the past year might be mentioned Prof. William Bulloch's report on the sterilisation of catgut, recent research on the virus of psittacosis, Dr. Dorothy Russell's classification of Bright's disease, and Dr. Donald Hunter's work on calcium metabolism. Dr. Paul Fildes was the general editor of the Medical Research Council's monumental "System of Bacteriology." In presenting the prizes Lord Rayleigh, F.R.S., said that to have a chance of contributing to science "it is far more important to be persevering, and to have a fearless regard for truth, and to keep your eyes open to what is going on about you, than to be very clever or very smart, or very apt in saying things and finding a ready retort to any objection that is made." He warned his audience against vague generalisations and high-sounding phrases, and urged them not to be content with answers until they were definite and satisfying. A great many vague theories were held by doctors and the public, and they needed earnest and conscientious investigation. Lord Knutsford and Dr. Robert Hutchison concluded the proceedings with a vote of thanks.

# MEDICAL NEWS

UNIVERSITY OF CAMBRIDGE.—At recent examinations the following candidates were successful:—

M.CHIR.

Alexander Simpson-Smith and C. I. Tuckett.

THIRD EXAMINATION FOR M.B. & B.CHIR.

*Part I., Surgery, Midwifery, and Gynæcology.*—N. W. Alexander, H. B. Bagshaw, W. I. Bain, C. O. Barnes, J. H. Beilby, A. T. Blair, O. H. Bostock, H. G. H. Butcher, G. F. Carey, H. M. Chappel, W. F. Church, J. H. Conyers, O. J. C. Cotton, R. M. S. Cross, C. A. de Candole, R. M. Dowdeswell, W. S. Dyson, R. H. Fish, E. D. Forster, H. S. H. Gilmer, C. E. D. H. Goodhart, S. E. F. Gooding, A. H. Gurney, G. Hale, J. H. Hall, C. J. K. Hamilton, F. R. T. Hancock, J. O. Harrison, W. Heath, T. C. Jameson Evans, H. D. B. Kelly, R. O. Lee, J. D. McVean, H. Mallinson, F. E. Pilkington, V. H. Riddell, N. H. L. Ridley, H. E. W. Roberton, M. H. Salaman, J. G. Sleigh, E. M. P. Smith, D. J. R. Steen, E. S. Stern, H. C. Stewart, M. Sutcliffe, J. W. P. Thompson, A. W. Vaisey, G. W. Whittall, T. D. G. Wilson, F. G. Wood-Smith, and R. H. Young.

*Part II., Physic, Pathology, and Pharmacology.*—A. F. Alsop, G. O. Barber, J. H. Bentley, R. M. Bolam, F. G. Booker, W. V. Bowman, W. V. Boyle, O. J. C. Cotton, A. C. Crooke, H. Curtis, C. H. England, J. S. S. Fairley, R. H. Fish, W. R. Forrester-Wood, I. J. Franklen-Evans, G. N. Grose, A. S. Hall, P. E. T. Hancock, R. L. Hoffman, F. W. Holdsworth, L. E. Houghton, E. H. Hudson, M. M. St. G. Johnstone, M. Koettlitz, R. O. Lee, P. G. Levick, A. Lister, D. G. Macdonald, S. McDonald, W. M. Macgregor, F. G. Maitland, R. W. Malim, C. E. P. Markby, H. L. Milles, I. B. Morris, B. C. Nicholson, V. P. Paxon, J. O. Poynton, C. B. Prowse, W. Radcliffe, T. G. Reah, J. Richardson, H. W. Sadlier, J. D. Simpson, G. H. G. Southwell-Sander, R. S. Stacey, E. C. Sugden, C. P. K. Toland, J. C. G. Whitelaw, and F. S. Winton.

UNIVERSITY OF OXFORD.—On June 25th the honorary degree of D.Sc. was conferred on Sir Arthur Keith, F.R.S., and on the following day the degree of B.M. was conferred on G. Campbell.

The Board of Awarders has awarded the Osler Memorial Medal for 1930 to Sir Wilmot Herringham. It is given every fifth year to the Oxford medical graduate who has, in the opinion of the Board of Awarders, made the most valuable contribution to the science, art, or literature of medicine, and who has not previously received the medal.

UNIVERSITY OF MANCHESTER.—Dr. Walter Schlapp has been appointed lecturer in experimental physiology, Dr. J. M. Yoffey assistant lecturer in anatomy, Dr. F. N. Marshall and Dr. Donal Sheehan demonstrators in anatomy, and Dr. I. B. Winter demonstrator in human physiology.

UNIVERSITY OF DURHAM.—On June 26th the honorary degree of D.C.L. was conferred on Lieut.-General H. B. Fawcus, Director-General of the Army Medical Services.

LEAGUE OF NATIONS PUBLICATIONS.—Messrs. George Allen and Unwin, Ltd., have taken over the agency, for Great Britain, Northern Ireland and the Crown Colonies, of League of Nations publications. They will conduct all the League business from 38, Great Ormond-street, W.C. 1 (Museum 1439), and not from their address in Museum-street. The London office of the League for all purposes except the sale of publications, remains at 16, Northumberland-avenue, W.C. 2.

PADDINGTON MEDICAL SOCIETY.—At a meeting of this Society to be held at 9 P.M. on Tuesday, July 8th, at the Great Western Hotel, Dr. G. E. Oates, medical officer of health for Paddington, will give an address on Public Health Topics of General Interest. A resolution for the appointment of a section in connexion with the National Health Insurance Acts will be considered and reports will be received from representatives on other bodies.

RECEPTION TO AMERICAN PUBLIC HEALTH ASSOCIATION.—At the London School of Hygiene and Tropical Medicine on the evening of June 27th Sir Harry Goschen and members of the board of management received members of the Association which is on a visit to Europe to attend international congresses of hygiene in Paris and Dresden, their stay in London being very brief. A number of prominent public health officials were invited to meet them, amongst them officers of the Ministry of Health and of the London County Council, medical officers of health of London boroughs, and representatives of the various central voluntary health associations. During the course of the evening Prof. M. Greenwood gave two ten-minute talks in the statistical laboratory, the first on forecasting the trend of infectious diseases, the second on teaching the elements of statistics to public health students. The other laboratories were open to inspection.

A SURGICAL SCHOLARSHIP.—The Association of Surgeons of Great Britain and Ireland invite applications for a scholarship of £350, to enable the holder to pursue a definite line of research or study at home or abroad. Particulars will be found in our advertisement columns.

HEBREW UNIVERSITY OF JERUSALEM.—The children of Mr. and Mrs. F. Warburg have established a Fellowship in public health in the name of their parents. The fund yields £P.120 a year, and will be awarded annually to a young investigator who is to work in the department of hygiene of the University on a problem of special importance to Palestine. Applications should be made in proper form to the director of the department not later than August 31st.

ENLARGEMENT OF CAERPHILLY HOSPITAL.—Seven years ago Caerphilly District Miners' Hospital was opened with 22 beds. Enlargement speedily became necessary, and a new ward block has now been completed containing 54 beds, together with a new out-patients' department, with consulting-rooms for eye, ear, nose, and throat cases.

COLLEGE OF PESTOLOGY.—The College held a reunion luncheon at the Connaught Rooms on June 25th; the Duke of Sutherland, its new President, occupied the chair, and among the guests were Sir Thomas Horder and Sir Aldo Castellani. Colonel S. P. James, of the Ministry of Health, in proposing the health of the College, said that the Ministry sympathised with its aims and recognised their importance to the national health, but that the help of the public, financial and practical, was more valuable than official sympathy. The President appealed for funds to carry on the work of investigation and enlightenment.

ORDER OF THE HOSPITAL OF ST. JOHN OF JERUSALEM.—The King has sanctioned the following promotions in and appointments to the Venerable Order of the Hospital of St. John of Jerusalem:—As Knight of Grace: Dr. W. E. Audland. As Commanders: Dr. L. F. R. Knuthsen, Dr. Ll. A. Morgan, Dr. A. Ellison, Dr. J. F. Arlidge, Dr. J. E. Nevins, Dr. W. M. Cairns, Dr. K. H. Beverley, Lt.-Col. S. M. W. Meadows, R.A.M.C., and Dr. J. H. Chambers. As Officers: Sir John W. Thomson-Walker, Dr. F. Romer, Dr. E. S. Jackson, Dr. Tom Sanderson, Dr. A. J. Young, Dr. H. J. Clutterbuck, Dr. G. S. Phillips, and Dr. J. M. Wilson. As Serving Brothers: Dr. H. C. Darby, Dr. T. Bell, Dr. F. B. G. Holmes, Dr. H. G. Ramsbottom, Dr. N. J. L. Rollason, Dr. E. J. Deck, Dr. Charles Edgar Whitcher, and Dr. E. E. Dufty. As Serving Sister: Dr. Catherine M. Edgerley.

THE CHILDREN'S CLINIC.—A meeting was held in the Women's Service Hall on June 25th in support of the clinic established at 85, Clarendon-road, London, W., for the observation and treatment of nervous and delicate children. Prof. Winifred Cullis, who presided, said that in this country new advances in medicine tended to grow out of the hospital system, first as voluntary enterprise, and then as a link in some way or another with organised medicine. She believed this clinic was the beginning of a movement which had come to stay. Miss Coster, Principal of Wychwood School, Oxford, spoke of the need of emotional training rather than indiscriminate outlet, and pointed out how psychological maladjustment arose from emotional stresses to meet which the child had not been properly prepared. Dr. Margaret Lowenfeld, the honorary medical director of the clinic, set out the relationship of the work of the clinic to national and economic problems, pointing out that £300,000 was spent last year on the maintenance of boys and girls between the ages of 16 and 21 in prison, while in her view it would cost only £30,000 a year to keep them out. Moreover, that £300,000 spent on prisons produced no improvement, and in many cases even produced deterioration. She said that the child world was dream world made out of phantasy, and had little contact with actual life; a child built all his life out of pictures which were the fulfilment of his wishes. In the clinic the child was set to play; his make-believe world came to light, and his desires were understood and adjusted to socially useful ends. Maladjustment and delinquency in children arose from physical and emotional causes. The clinic was staffed by a team of workers who attacked the problem from all sides; social, constitutional, psychological, and biochemical. It had been constructed on lines which allowed of the use of records of every case as permanent material for study. The band of people representing the clinic had used every effort to bring the clinic to its present stage, and now appealed to the public to enable it to be developed.

# Medical Diary

*Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.*

## SOCIETIES.

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES.

SATURDAY, July 12th.—3 P.M. (at the East Suffolk and Ipswich Hospital, Ipswich) Annual General Meeting. Mr. F. F. Ward: The History of the Development of a Venereal Disease Clinic. (Meeting preceded by luncheon for members and their friends at the White Horse Hotel.)

## LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn-fields, W.C.

WEDNESDAY, July 9th.—5 P.M., Dr. Harvey Cushing: Neurohypophysial Mechanisms from a Clinical Point of View. (Lister Lecture.)

THURSDAY.—2.45 P.M., Prof. H. R. Dew: Hydatid Disease: Some Interesting Complications. (Hunterian Lecture.)

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, July 7th, to SATURDAY, July 12th.—VICTORIA PARK HOSPITAL, Cambridge Heath, E., Tues., 2 P.M., Demonstration on Heart Cases by Dr. Shirley Smith. No fee.—SOUTH LONDON HOSPITAL FOR WOMEN, 88, Newington-causeway, S.E. Wed., 2 P.M., Demonstration of Cases by Miss Margaret Basden. Open to women graduates only. No fee.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.

MONDAY, July 7th.—2.30 to 5 P.M.: Medical, Surgical, and Gynæcological Clinics. Operations.

TUESDAY.—2.30 to 5 P.M., Medical, Surgical, Ear, Nose and Throat Clinics. Operations.

WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin, and Eye Clinics. Operations.

THURSDAY.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, Throat, and Ear Clinics. Operations

FRIDAY.—10.30 A.M.: Ear, Nose, and Throat Clinics. 2.30 to 5 P.M., Medical, Surgical, and Children's Diseases Clinics. Operations.

# Appointments

BRAIN, W. RUSSELL, D.M., M.R.C.P., has been appointed Assistant Physician to the Royal London Ophthalmic Hospital.

Certifying Surgeons under the Factory and Workshop Acts: BEWES, A. G., L.R.C.P. Lond., M.R.C.S. (Southend); and ROUTH, J. L., L.R.C.P. Lond., M.R.C.S. (Okehampton).

City of London Maternity Hospital: MARSHALL, C. M., M.B., Ch.B. N.Z., F.R.C.S. Eng., Resident Medical Officer: ALLINSON, F. W., M.B., B.S. Lond., Assistant Resident Medical Officer.

# Vacancies

***For further information refer to the advertisement columns.***

*Aberdeen Royal Hospital for Sick Children.*—Res. H.P. Two Res. H.S.'s. Also Hon. Asst. S. to Ear, Nose and Throat Dept.

*Aberystwyth Infirmary and Cardiganshire General Hospital.*—H.S. £200.

*All Saints' Hospital for Genito-Urinary Diseases, 91, Finchley-road, N.W.*—Hon. Surgical Registrar.

*Association of Surgeons of Great Britain and Ireland.*—Surgical Scholarship. £350.

*Barnsley, Beckett Hospital and Dispensary.*—H.P. £200.

*Bath, Royal United Hospital.*—H.P. £120.

*Birmingham, Highbury Hospital, Moseley.*—Res. Asst. M.O. £300.

*Birmingham, Selly Oak Hospital.*—Surgeon. £700.

*Blackburn Royal Infirmary.*—Res. H.P. £175.

*Bolingbroke Hospital, Wandsworth-common, S.W.*—Res. M.O. Chiefly surgical. £200. Also H.P. At rate of £120.

*Bolton County Borough.*—Asst. M.O.H. and Asst. School M.O. £500.

*Bournemouth County Borough, Malvern and Winton Infant Welfare Centres.*—Medical Attendant. 1½ guineas per session.

*Brighton, Royal Sussex County Hospital.*—Cas. H.S. £120.

*British Red Cross Society, Clinic for Rheumatism, Peto-place, Marylebone-road, N.W.*—Hon Consulting Surgeons, &c.

*Central London Ophthalmic Hospital, Judd-street, St. Pancras, W.C.*—Sen. and Jun. H.S.'s. At rate of £120 and £100 respectively.

*Charing Cross Hospital, W.C.*—Res. Anæsthetist. At rate of £100.

*Colchester, Royal Eastern Counties' Institution for Mentally Defective.*—Clin. Research Worker. £600.

*Croydon General Hospital.*—Hon. Anæsthetist.

*Derby, Derbyshire Royal Infirmary.*—Ophth. H.S. £150.

*Doncaster Royal Infirmary.*—Three H.S.'s, and One H.P. All at rate of £150.

*Dudley, Guest Hospital and Eye Infirmary.*—Asst. H.S. £150.

*Egyptian University Faculty of Medicine.*—Prof. of Hygiene. £E.1500.

*Essex, Administrative County of.*—Asst. M.O.H. £500.

*Evelina Hospital for Children, Southwark, S.E.*—H.S. At rate of £120.

*Gloucester, Gloucestershire Royal Infirmary, &c.*—H.P. and 2nd H.S. At rate of £135 and £100 respectively.

*Halifax Royal Infirmary.*—3rd H.S. At rate of £125.

*Hertford County Hospital.*—H.P. At rate of £150.

*Hospital for Consumption and Diseases of the Chest, Brompton, S.W.*—H.P. At rate of £50.

*Hospital for Sick Children, Great Ormond-street, W.C.*—Med. Reg. and Pathologist. £300.

*Ilford, King George Hospital.*—Hon. Neurologist.

*Indian Medical Service Commissions.*

*Inverness Royal Burgh, P.H. Dept.*—Asst. M.O.H.

*Ipswich Borough Mental Hospital.*—Med. Supt. £700.

*Kensington, Fulham and Chelsea General Hospital.*—Res. Cas. M.O. At rate of £100.

*Lancaster County Mental Hospital.*—Temp. Asst. M.O. Seven guineas weekly.

*Leeds Public Dispensary.*—Jun. Res. M.O. £150.

*Lincoln County Hospital.*—Jun. H.S. At rate of £150.

*Liverpool, David Lewis Northern Hospital.*—Medical Tutors and Registrars. Each £175. Also Four H.S.'s, and Two H.P.'s. Each £100.

*Manchester, City of, Education Committee.*—Asst. School M.O. £600.

*Manchester Northern Hospital, Park-place, Cheetham Hill-road.*—Sen. H.S., and Jun. H.S. £130 and £100 respectively.

*Manchester Royal Eye Hospital.*—Jun. H.S. £120.

*Manchester Royal Infirmary, Central Branch, Ruby-street.*—Jun. H.S. and Cas. O. At rate of £100.

*Manchester, St. Mary's Hospitals.*—Four H.S.'s. At rate of £50.

*Manitoba University.*—Asst. Professor of Anatomy. 3500 dollars.

*Middlesbrough, North Ormesby Hospital.*—H.P. £120.

*Middlesex County Council.*—Asst. M.O. £600.

*Mile End Hospital, Bancroft-road, E.*—Deputy Med. Supt. £600.

*Miller General Hospital, Greenwich-road S.E.*—Cas. O. £150.

*Ministry of Health, Government Lymph Establishment, Hendon.*—Bacteriologist. £700 and bonus.

*National Hospital, Queen-square, W.C.*—H.P. £150.

*Newark General Hospital.*—Res. H.S. At rate of £150.

*Newcastle-upon-Tyne, City Hospital for Infectious Diseases.*—Res. Med. Asst. £350.

*Newport, Mon., Royal Gwent Hospital.*—Hon. Radiologist.

*Northampton General Hospital.*—Asst. H.S. At rate of £150.

*Norwich, Norfolk and Norwich Hospital.*—H.S. £120.

*Northwood, Mount Vernon Hospital.*—Gynæcologist.

*Nottingham General Hospital.*—H.S. At rate of £150.

*Oldham County Borough Education Committee.*—Asst. Sch. M.O. £500.

*Plymouth City Hospital.*—Med. Supt. £1000.

*Plymouth, South Devon and East Cornwall Hospital.*—H.S. At rate of £100.

*Poplar Hospital for Accidents, East India Dock-road, Poplar, E.*—Second Res. O. At rate of £175.

*Portsmouth Royal Hospital.*—Cas. O. At rate of £100.

*Preston and County of Lancaster Royal Infirmary.*—H.S. £150.

*Preston, Biddulph Grange Orthopædic Hospital.*—Radiographer. £200. Also Jun. H.S. At rate of £150.

*Prison Medical Service.*—Medical Officer, Class II. £350 and bonus.

*Queen's Hospital for Children, Hackney-road, E.*—Clin. Asst. for Orthopædic Dept. 5s. each attendance.

*Reading, Royal Berkshire Hospital.*—Cas. O. and Res. Anæsthetist. Each at rate of £150.

*Reading University.*—Independent Lecturer in Agricultural Bacteriology. £400–£500.

*Rhondda U.D.C.*—Asst. M.O.H. and Asst. School M.O. £500.

*Royal College of Surgeons of England.*—Examiner in Dental Surgery.

*Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.*—Cas. O. for Out-patient Department. £150.

*Salford Royal Hospital.*—H.P. and Cas. H.S. Each at rate of £125.

*Sheffield Royal Hospital.*—H.S. to Ear, Nose and Throat Dept. Also Res. Anæsthetist. Each at rate of £80.

*Sheffield Royal Infirmary.*—Two H.S.'s. Also Ophth. H.S. Each at rate of £80.

*Sheffield, Jessop Hospital for Women.*—Registrar and Obstetrical Tutor. £500.

*Shrewsbury, Royal Salop Infirmary.*—Res. Surg. O. £200.

*St. John's Hospital Lewisham, S.E.*—Hon. Surgeon, also Res. M.O. £250.

*St. Thomas's Hospital.*—Jun. Asst. to Venereal Dept. £250.

*Swindon and North Wilts Victoria Hospital.*—Res. M.O. At rate of £125.

*Taunton and Somerset Hospital.*—Jun. H.S. At rate of £100.

*Truro, Royal Cornwall Infirmary.*—H.S. £170.

*Walsall General Hospital.*—Cas. H.S. At rate of £120.

*Warwickshire C.C.*—Asst. County M.O.H. £500.

*Weir Hospital, Grove-road, Balham, S.W.*—Jun. Res. M.O. £150.

*West African Medical Staff.*—M.O.'s. Each £600.

*West End Hospital for Nervous Diseases, 73, Welbeck-street, W.*—Jun. H.P. At rate of £100.

*West London Hospital, Hammersmith-road, W.*—Res. Asst. Phys. £300.

*Winchester, Royal Hampshire County Hospital.*—H.P. £150.

*Wolverhampton Royal Hospital.*—Cas. O. and H.S. to Ear, Nose and Throat Dept. At rate of £125.

*Wrexham and East Denbighshire War Memorial Hospital.*—Two Res. H.S.'s. Each at rate of £150.

The Chief Inspector of Factories announces a vacant appointment for a Certifying Factory Surgeon at Newburn (Northumberland).

# NOTES, COMMENTS, AND ABSTRACTS

## MENSTRUATION IN SCHOOLGIRLS.*

### A SURVEY BASED ON REPLIES TO A QUESTIONAIRE.

THE subject of menstruation is of importance to all persons responsible for the health of women or girls, and the present inquiry was undertaken to fill some obvious gaps in current knowledge. In the year 1925 the London Association of the Medical Women's Federation were approached by a medical officer of health with a request for information about the effect of school games on menstruation, and what rules concerning playing at these periods were usually prescribed to pupils. The Association found that although their members could contribute a great mass of clinical experience on this subject, there was a surprising lack of exact data on this as, indeed, on most other points dealing with menstruation in the normal girl. The difficulty had always been that of finding suitable avenues of approach to a sufficiently large sample group of healthy girls, and of overcoming the obvious objections to questioning adolescents on such an intimate matter.

The Association were fortunate in learning that the Ling Association of trained gymnastic instructresses was about to initiate an inquiry on the same subject. They agreed to join forces and later the generous coöperation of the Headmistresses Association was secured. A questionaire, approved by representatives of the three societies, was drawn up and circulated by the headmistresses to several hundred schools. As it was all important that the questionaire should prove acceptable to mistresses and parents, some of the original points on which the medical women had desired information had to be omitted or greatly modified. The questionaire sent was as follows:—

LONDON ASSOCIATION OF THE MEDICAL WOMEN'S FEDERATION.

*Inquiry dealing with Menstruation in School-children.*

(To be filled up in respect of girls who have attained their 14th birthday, and who have menstruated.)

1. Name or Number.....
2. Age.....
3. Previous history:
   (A) Illnesses (cross out any of the following illnesses the child has not had)—
      (*a*) Rheumatic fever. (*b*) St. Vitus' dance.
      (*c*) Heart disease.
   (B) Has the girl had any other illnesses, infectious or otherwise, which kept her away from school? If so, what were they? Give date and duration if possible.
   (C) Has she had any operation? If so, what was it for? Give date.
4. Age at which monthly periods began.
5. Are they regular? If so, how many days elapse between the first day of the one period and the first day of the next? If not regular, state as precisely as possible how often they occur.
6. Is a record kept of the occurrence of the period?
7. How many days does the period last?
8. Does the girl have any pain? If so, does it come on (*a*) before the period? (*b*) During the period? (*c*) After the period?
9. Does the girl do exercises or play games during the period?
10. Does she wish to? If not, what reason is given?
11. Is she definitely known to have headache at this time?
12. Is she constipated at this time?
13. Do her general health and happiness appear to be as good as usual during the period?
14. Has she ever had to stay away from school owing to periods?

*Remarks.*—Date. School which the child attends. Signature of parent or school doctor, or gymnastic mistress, or headmistress. N.B.—If preferred, initials may be given instead of the full signature.

The response was unexpectedly large, and the committee cannot express too strongly their thanks to the large number of those who so materially assisted in filling in the forms. Over six thousand questionaires were returned completed, filled in by headmistresses themselves or by assistants on their staff, gymnastic mistresses, the school doctor, parents or in some instances by the children. Such a mass of material has been no easy matter to handle, and the committee were fortunate in securing Prof. M. Lucas Keene and Miss Ethel Hewer, D.Sc., to undertake the scientific review and to direct the course of the analysis.

Satisfactory results could, however, only be obtained under the guidance of an expert statistician, and Prof. Major Greenwood kindly allowed a member of his staff, Miss E. Newbolt, to make a preliminary analysis. She was unfortunately unable to continue the investigation, and Dr. Doris Baker was asked to bring the work to completion. This she has done under the kind direction of Dr. Peter McKinlay, to whom, with Prof. Major Greenwood, the committee is greatly indebted. The tables recording the detailed figures are available for inspection; for reasons of space a few only are here included.

The schools from which replies were received were grouped as follows:—

| | Number of schools. | Number of returns. |
|---|---|---|
| (*a*) Day schools— | | |
| 1. High schools .. .. | .. 23 ..... | 1495 |
| 2. Secondary schools .. | .. 54 ..... | 3209 |
| (*b*) Boarding schools— | | |
| 1. Private .. .. .. | .. 25 ..... | 1220 |
| 2. Charitable institutions | .. 10 ..... | 175 |
| | 112 | 6099 |

### Statistical Analysis of Results.

The main points which the committee desired to investigate were:—

1. Characteristics of the menstrual period: (*a*) regularity; (*b*) duration.

2. Extent of disability from menstruation during adolescence as indicated by: (*a*) incidence of pain; (*b*) effect on general health and happiness; (*c*) absence from school; (*d*) relation to physical exercise.

3. Relation of length of menstrual history to the above.

### Characteristics of Period.

REGULARITY OF PERIOD AND LENGTH OF INTERVAL.

The frequency distribution of the intervals between the periods (reckoning from one onset to another) shows a definite peculiarity—i.e., the lack of any general tendency to fill smoothly on both sides of a maximum value. (For actual numbers see Table I.) Several peaks are apparent, indicating that a heaping up of cases occurs at weekly intervals, three, four, five weeks, with the greatest frequency at 28 days. Similar predilections for round numbers are found in the records of age-distribution at census enumerations, and these should make one hesitate to believe that the detailed distributions of interval given here represents the *true* frequency at each of these days. The results may be divided into three groups:—

| | |
|---|---|
| (1) Above 28 days and varying .. .. .. | 36·3 |
| (2) 28 days or varying above and below .. .. | 41·7 |
| (3) Below 28 days and varying below .. .. | 21·9 |

The percentage recorded as 28 days exactly was 39·2. It was found that the figures given by girls whose actual records were kept, when extracted separately, do not vary significantly from the figures of *all* samples.

*Regularity and pain.*†—The incidence of regular

* Being a report on an inquiry into menstruation in schoolgirls based on over 6000 replies to a questionaire by a committee of the London Association of the Medical Women's Federation.

† "Pain" includes all degrees, however slight and transient.

periods is definitely slight, though greater among those girls not suffering from pain. The percentage of "regulars" among the "no pain" group was 79·6, compared with 73·4 among the remainder.

Classified in relation to the separate type of pain groups the incidence of regularity is as follows:—

| | | |
|---|---|---|
| No pain | | 79·6 |
| Pain before period | 74·4 | 76·8 |
| " " " (slight) | 82·3 | |
| Pain during period | 75·0 | 75·8 |
| " " " (slight) | 77·4 | |
| Pain after period | 66·7 | 62·5 |
| " " " (slight) | 60·0 | |
| Pain before and during | 59·3 | 59·6 |
| Pain before, during, and after | 69·2 | |

*Length of interval and pain.*—For the purposes of correlation the distribution of pain has been classified according to its presence or total absence. The interval has been treated in three broad categories:—

(1) Above 28 and varying above.
(2) 28 exactly.
(3) Below 28 and varying below.

The figures, however, do not show results of any positive importance, and the whole series taken together suggests an absence of definite relationship between the two factors. The general conclusion would appear to be that the presence or absence of pain is not dependent on the length of the interval.

### (*b*) DURATION OF PERIOD.

The average duration of the periods in all girls in the three groups of schools is as follows:—

| | |
|---|---|
| High schools | 5·14 days. |
| Secondary schools | 4·92 " |
| Boarding schools | 4·76 " |
| Residential institutions | 4·47 " |

The returns for individuals were, of course, stated in days and not in fractions of days. The limits of variation were 2 to 14 days, the mean being four or five days. It was noted, however, that some of the girls whose period lasted 14 days played games throughout and made no complaint of pain or ill-health.

As regards the effects of *exercise*, the average duration in the two groups (1) taking full exercise throughout the period, (2) limiting their exercise, shows a difference which is certainly statistically significant. (For actual figures see Table II.)

| | |
|---|---|
| Girls taking full exercise | 5·20 days. |
| Girls limiting exercise | 5·33 " |
| Difference | 0·1382 " |

TABLE II.—*Duration and Exercise.*

| Days. | Exercise— | | Days. | Exercise— | |
|---|---|---|---|---|---|
| | Full. | Limited. | | Full. | Limited. |
| 1 | — | 1 | 7 | 342 | 253 |
| 2 | 4 | 3 | 8 | 17 | 27 |
| 3 | 130 | 64 | 8+ | 11 | 9 |
| 4 | 637 | 280 | | | |
| 5 | 1287 | 748 | Total | 3204 | 1792 |
| 6 | 776 | 407 | | | |

There is, therefore, a shorter average duration in girls taking exercise throughout the period, but it is impossible to say whether exercise shortens the period or whether the girls with shorter periods tend to take exercise throughout.

There is also a slight but definitely significant relation between *pain* and the duration of the periods. If we consider first of all the two broad groups, those with pain and those without, we find the average duration as follows:—

| | |
|---|---|
| Girls with no pain | 4·81 days. |
| Girls with pain | 5·10 " |

The greatest difference is in those suffering both *before* and *during* the period (5·28 days), and is least in those suffering pain only *before*.

| | |
|---|---|
| No pain | 4·81 |
| Pain before | 4·88 |
| Pain during | 5·12 |
| Pain during and before | 5·28 |

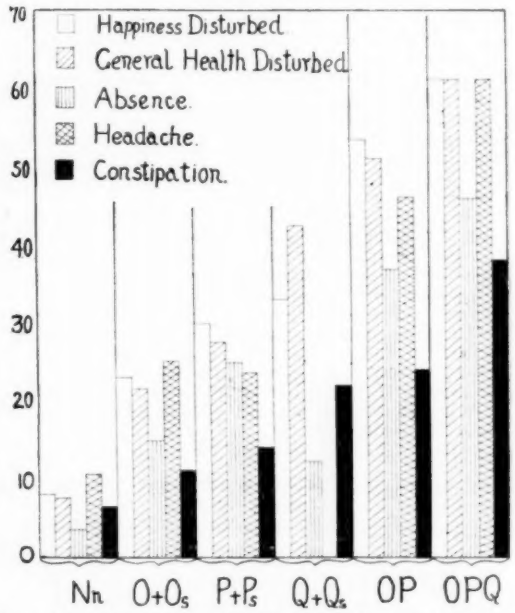
Correlation ratio 0·246 is definitely significant.

## Extent of Disability from Menstruation in Adolescence.

### INCIDENCE OF PAIN.

The records for three of the groups of schools—the high schools, the secondary schools, and the boarding schools—give results showing a fairly close resemblance one to another. (See Fig. 1.) Something

FIG. 1.




Percentage incidence of various disabilities during the menstrual period. Nn = No pain. O = Pain before period. Os = Pain before period sometimes. P = Pain during. Ps = Pain during sometimes. Q = Pain after. Qs = Pain after sometimes. O.P = Pain before and during. O.P.Q. = Pain before, during, and after.

more than half the total in each group—i.e., 52·4, 55·4, and 59·9 per cent.—are recorded as not suffering from pain, however slight or transient, at any time during the menstrual period. The remaining group (the charitable institutions) show a considerably higher proportion of "no pain" than this—i.e., 71·7 per cent. of the total.

The wide discrepancy between this and the other three groups suggests the influence of some special factor at work here, possibly a difference in the methods of recording the data. As the numbers in this group were very small, they are omitted in any combined work. Considering then only the first three groups, the records show that among those suffering some pain, the majority, slightly more than half (25·9 per cent.) falls in the group *during the period* whereas a negligible proportion only suffer *after* the period (1·6). Only 10·4 claim to suffer *before* the onset, and about the same number (6·8) *before and during* the period. Sufferers over the long stretch, before, during, and after the period, are an insignificant fraction of the whole. (For distribution of pain, see Table III., A, B, C, and D.)

In the three groups of schools the variations in frequency of pain are not very large. The chief differences are in (1) the main group of "no pain," where the high schools show a smaller proportion than the boarding schools; and in (2) the group showing pain *during* the period, in which the pro-

TABLE I.—DISTRIBUTION OF INTERVAL IN SCHOOLS.

*Actual numbers.*

| — | A.C. | B.F. | B.E. | A.D. | A.C., A.D., and B.F. |
|---|---|---|---|---|---|
| Above 28 | 253 } 521 | 129 } 428 | 23 } 50 | 644 } 1023 | 1026 } 1972 |
| „ „ varying | 268 } | 299 } | 27 } | 379 } | 946 } |
| 28 | (a) 437 } 491 (b) | (a) 321 } 390 (b) | (a) 20 } 40 (b) | (a) 1283 } 1384 (b) | 2041 } 2265 |
| Varying above and below | (c) 54 } | (c) 69 } | (c) 20 } | (c) 101 } | 224 } |
| Below 28 | 175 } 232 | 114 } 165 | 26 } 37 | 378 } 471 | 988 } 1189 |
| „ „ varying | 57 } | 51 } | 11 } | 93 } | 201 } |
| Total (*b*) | 1244 | 983 | 127 | 2878 | 5426 |
| Total (*a*)—i.e., omitting (*c*) | 1190 | 914 | 110 | 2777 | 5202 |

(*a*) = Omitting (*c*) viz.: those varying both above and below 28. (*b*) Including (*c*) and putting them in the 28 group.

TABLE III. (A).—DISTRIBUTION OF PAIN.

| — | No pain. | | Pain sometimes. | | Not recorded. | | Total. | Total recorded. |
|---|---|---|---|---|---|---|---|---|
| | No. | Per cent. of those recorded. | No. | Per cent. of those recorded. | No. | Per cent. of total. | | |
| A.C. .. .. | 788 | 52·4 | 734 | 48·2 | 21 | 1·4 | 1543 | 1522 |
| A.D. .. .. | 1769 | 55·4 | 1420 | 44·5 | 26 | 0·82 | 3214 | 3188 |
| B.F. .. .. | 712 | 58·9 | 495 | 41·0 | 13 | 1·1 | 1220 | 1207 |
| B.E. .. .. | 119 | — | 47 | 28·3 | 10 | 6·0 | 176 | 166 |
| All except B.E... | 3269 | 55·2 | 2696 | 45·6 | 60 | 1·0 | 5977 | 5917 |

TABLE III. (B).

| — | No pain. | | Pain sometimes, either before, during, or after. | | Pain either before, during, or after. | | Pain before and during. | | Pain before, during, and after. | | Total recorded. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Per cent. of those recorded. | No. | % | No. | % | No. | % | No. | % | |
| A.C. .. | 788 | 52·9 | 192 | 12·6 | 407 | 26·7 | 132 | 8·7 | 3 | 0·2 | 1522 |
| A.D. .. | 1769 | 55·4 | 343 | 10·8 | 878 | 27·5 | 190 | 6·0 | 9 | 0·28 | 3188 |
| B.F... .. | 712 | 58·9 | 155 | 12·8 | 260 | 21·5 | 79 | 6·5 | 1 | 0·08 | 1207 |
| B.E... .. | 119 | 71·6 | 5 | 3·0 | 31 | 18·7 | 10 | 6·0 | 1 | 0·6 | 166 |
| All except B.E... | 3269 | 52·2 | 690 | 11·7 | 1545 | 26·1 | 400 | 6·8 | 13 | 0·2 | 5917 |

TABLE III. (C).

| — | No pain. | | Pain before, always, and sometimes. | | Pain during, always, and sometimes. | | Pain after, always, and sometimes. | | Pain before, and during. | | Pain before, during, and after. | | Total recorded. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Per cent. of those recorded. | No. | % | No. | % | No. | % | No. | % | No. | % | |
| A.C. .. .. | 788 | 52·9 | 131 | 8·6 | 466 | 30·6 | 2 | 0·1 | 132 | 8·7 | 3 | 0·2 | 1522 |
| A.D. .. .. | 1769 | 55·4 | 367 | 11·5 | 849 | 27·0 | 5 | 0·2 | 190 | 5·9 | 9 | 0·3 | 3188 |
| B.F. .. .. | 712 | 58·9 | 127 | 10·5 | 285 | 24·0 | 3 | 0·2 | 79 | 6·5 | 1 | 0·08 | 1207 |
| B.E. .. .. | 119 | 71·6 | 21 | 12·7 | 2 | 12·1 | 0 | 0 | 10 | 6·0 | 1 | 0·6 | 166 |
| All except B.E... | 3269 | 55·0 | 625 | 10·7 | 1600 | 27·0 | 10 | 0·16 | 400 | 6·7 | 13 | 0·22 | 5917 |

TABLE III. (D).

| — | Nn. | | O. | | Os. | | P. | | Ps. | | Q. | | Qs. | | O.P. | | O.P.Q. | | N.R. | | Total. | Total recorded. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | | No. | % |
| A.C. .. | 788 | 52·9 | 93 | 5·11 | 38 | 2·49 | 313 | 20·5 | 153 | 10·0 | 1 | 0·07 | 1 | 0·07 | 132 | 8·6 | 3 | 0·19 | 21 | 1·4 | 1543 | 1522 | 98·6 |
| A.D. .. | 1769 | 55·4 | 258 | 8·09 | 109 | 3·41 | 617 | 19·35 | 232 | 7·27 | 3 | 0·09 | 2 | 0·06 | 190 | 5·95 | 9 | 0·28 | 26 | 0·8 | 3214 | 3188 | 99·1 |
| B.F. .. | 712 | 58·9 | 82 | 6·29 | 45 | 3·64 | 177 | 14·5 | 108 | 8·80 | 1 | 0·08 | 2 | 0·16 | 79 | 6·5 | 1 | 0·08 | 13 | 1·1 | 1220 | 1207 | 98·9 |
| B.E. .. | 119 | — | 13 | — | 3 | — | 18 | — | 2 | — | — | — | — | — | 10 | — | 1 | — | 10 | — | 176 | — | — |
| All except B.E. | 3269 | 55·2 | 427 | 7·2 | 191 | 3·2 | 1106 | 18·6 | 492 | 7·3 | 5 | 0·08 | 5 | 0·08 | 400 | 6·8 | 13 | 0·2 | 60 | 1·0 | 6977 | 5917 | 98·9 |

A.C. = High schools. A.D. = Secondary schools. B.F. = Boarding schools. B.E. = Residential institutions. Nn. = No pain.
O. = Pain before period. Os. = Pain before, sometimes. P. = Pain during. Ps. = Pain during sometimes. Q. = Pain after.
Qs. = Pain after sometimes. O.P. = Pain before and during. O.P.Q. = Pain before, during, and after. N.R. = Not recorded.

portion is greatest in the high schools and least in the boarding schools.

The figures for incidence of pain have been taken out separately for those with a menstrual history of one year or less. Comparison of these with the total series shows that the exclusion of those with short history reduces the proportion with no pain. The increased frequency of pain with longer experience chiefly falls in the group "pain *during* the period." The suggestion conveyed by the figures is that at the *onset* of menstruation fewer suffer pain than later in life, the chief increase being among girls suffering pain *during* the period.

The degree of pain was not specifically asked for in the questionaire, but 700 returns stated that pain was "slight." Only 61 out of 6099 complained that the pain was "bad" or "much" or "severe."

| Schools— | Slight. | Severe. | Total returns. |
|---|---|---|---|
| High .. .. .. | 218 .... | 13 .... | 1495 |
| Secondary .. .. | 366 .... | 43 .... | 3209 |
| Boarding .. .. | 116 .... | 5 .... | 1220 |

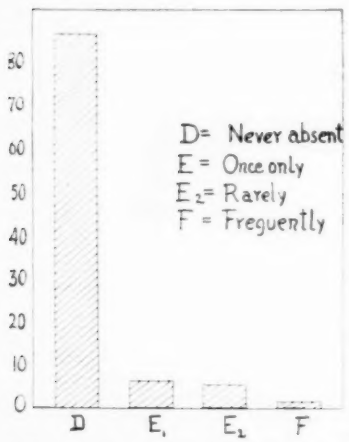
### EFFECT ON HEALTH AND HAPPINESS.

The total number of those recording an adverse effect on health and happiness was as follows:—

| Schools— | Happiness disturbed. | General health disturbed. | Headache. | Constipation. |
|---|---|---|---|---|
| High .. | 25·43 .... | 23·44 .... | 19·49 .... | 12·78 |
| Secondary .. | 17·86 .... | 16·59 .... | 19·06 .... | 9·89 |
| Boarding .. | 14·51 .... | 15·28 .... | 16·29 .... | 8·64 |

Thus headache, disturbed happiness, and interference with general health are in that order the most frequent concomitant effects of menstruation recorded. The association with pain is marked. The disturbance of health and happiness are nearly four times (3·7) as heavy an incidence in the girls complaining of pain as in the "no pain" group. Headache and constipation are only two to three times as frequent in the "pain" group.

FIG. 2.




Percentage of absences during menstrual period.

Inspection of the results for the individual pain groups shows a fairly definite order. The incidence of all these concomitant factors is lowest *before*, increases *during*, and still further *after*, and reaches the highest value in those with the long stretches of pain *before, during and after* the period.

### ABSENCE FROM SCHOOL.

The total number of girls recording absence from school is as follows. (See Fig. 2.)

| Schools— | Rare. | Frequent. |
|---|---|---|
| High .. .. .. | 13·85 ..... | 1·95 |
| Secondary .. .. | 12·6 ..... | 1·07 |
| Boarding .. .. | 7·65 ..... | 0·84 |

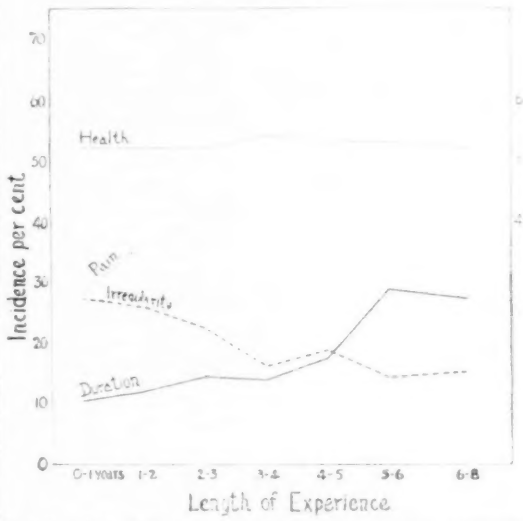
The figures for the three groups of schools have been classified as (1) no absences, (2) absent once only, (3) absent occasionally, (4) repeated absences.

| | Schools. | | |
|---|---|---|---|
| Absent— | High. Per cent. | Secondary. Per cent. | Boarding. Per cent. |
| Never .. .. | 83·3 .... | 86·5 .... | 91·9 |
| Once .. .. | 8·6 .... | 6·6 .... | 3·3 |
| Rarely .. .. | 6·1 .... | 5·8 .... | 3·8 |
| Repeatedly .. .. | 2·0 .... | 1·1 .... | 0·9 |

The average of those who are never absent is, therefore, high, while serious absences are a negligible proportion—under 2 per cent.

Absence from school may, therefore, be considered an infrequent event. It is six times more common among those who record pain, and habitual absence is ten times more frequent in this group.

FIG. 3.




Relation of health, pain, irregularity, and duration to length of menstrual history.

### EXERCISE.

The practice of the three groups of schools in regard to exercise‡ during the period show quite an appreciable difference.

| Schools— | Per cent. | |
|---|---|---|
| High .. .. | 57·8 | exercise during the entire period. |
| Secondary .. .. | 69·8 | |
| Boarding .. .. | 40·9 | |

The difference is due to the greater restrictions on exercises (either throughout the period or for the first two or three days) in the boarding schools than in day schools.

*Pain and exercise.*—The returns have been classified into: 1. (*a*) Groups with pain, and (*b*) No pain. 2. (*a*) Full exercise throughout the period, and (*b*) Exercise limited.

| | GROUPS WITH PAIN. Exercise— | | NO PAIN. Exercise— | |
|---|---|---|---|---|
| | All the time. | Limited. | All the time. | Limited. |
| High .. | 49·3 .... | 50·7 .... | 72·7 .... | 27·3 |
| Schools— | | | | |
| Secondary .. | 66·7 .... | 33·3 .... | 83·3 .... | 16·7 |
| Boarding .. | 31·5 .... | 68·5 .... | 50·8 .... | 49·2 |

The results show association of quite a definite kind between the two factors of pain and exercise, the proportion of those taking exercise all the time who experience no pain being substantially greater than the proportion among those who do *not* have exercise all the time. The correlation could, of course, be interpreted the opposite way by saying that a greater proportion of girls who have no pain take exercise throughout the period than of those who *do* have pain. The figures only show that the two factors, absence of pain and exercise, are significantly associated; they cannot show which is cause and which is result. Whether, in fact, it is the taking of exercise which tends to reduce the frequency of pain, or whether it is the absence of pain which permits the indulgence in exercise the figures do not show.

‡ "Exercise" here only refers to formal exercises and organised games and *not* to out-of-school activities.

### Relation of Length of Menstrual History to Above.

The length of menstrual history is found to range from under one year to eight years, and has been worked out for tabular presentation at yearly intervals. (See Fig. 3.) The incidence of *disturbance of general health, pain, and absence from school* is found to increase steadily and gradually throughout the whole range of the menstrual histories here recorded. (The groups 6 to 7 years and 7 to 8 years have been combined owing to the smallness of the numbers available.) Next in order comes *disturbance of health*, where the rate increases nearly threefold from the beginning of menstrual history till the end of the eighth year. *Pain* (all degrees) increases from 28 per cent. to 73 per cent. within this period. On the other hand, there is a definite reverse movement in the case of *irregularity*. Here there is a substantial decrease in incidence with increasing length of history, the rate falling from 27 per cent. in the first year to 15 per cent. in those of 6 to 8 years' experience. The average *duration* of the period has been calculated for each group, and there is obviously no evidence of association—the duration of menstruation does not change significantly with increased length of menstrual history.

### Summary.

1. The distribution of the interval between the periods is peculiar and suggests a predilection for whole weeks—i.e., the frequencies recorded at 21, 28, and 35 days seem exceptionally high. The most frequently occurring interval is centred on 28 days.

2. The presence or absence of pain does not seem to be sensibly correlated with length of interval.

3. The regularity of the period is significantly but slightly related to pain, the proportion recorded as regular being more in the "no pain" group than in all others.

4. The average duration of the period is definitely but very slightly lower among girls taking full exercise throughout the period.

5. The duration is longer (about one-third of a day) in those who suffer pain than in those who do not.

6. Slightly more than half of the girls studied do not suffer pain or discomfort, however slight, at any time during the menstrual period.

7. Of those recorded as suffering pain, the majority suffer *during* the period only.

8. The difference in the incidence of pain in the three groups of schools (high, secondary, and boarding schools) when analysed separately are not very large.

9. The distribution of the number of girls taking full exercise throughout the period in the three groups of schools shows appreciable differences, and contrasts with the much smaller differences between the groups of schools in respect of incidence of pain.

10. Pain and exercise seem to be definitely related one to another, but from these data it is impossible to suggest which is cause and which is effect.

11. The incidence of disturbed happiness or general health, headache, and constipation is definitely related to the presence of pain, the influence being most apparent in the case of disturbed health and happiness and least in headache and constipation.

12. Absence from school is definitely related to the occurrence of pain, but regular or frequent absence is very rare at any time during adolescence.

13. The time in the menstrual cycle at which the pain occurs is related to all the above factors. The incidence of all of them increases steadily and gradually in the following order: With no pain; pain before the period; during the period; after; and before, during, and after the period.

14. Comparison of the whole series and that obtained by excluding girls with a history of one year or less suggests that at the early period of menstruation a smaller proportion of girls suffer pain than later, during the age-period studied (onset to 18).

15. Analysis of the whole series by years shows that the rise of incidence of pain is steady and gradual throughout the menstrual histories studied. The rate increase over 8 years is less than three times the original value.

16. The incidence of disturbed general health and happiness also increases progressively with length of menstrual history.

17. Irregularity definitely decreases in incidence with increasing length of history.

18. The average duration of the period shows no tendency to rise or fall with increasing length of history.

### Commentary.

In considering the results of the inquiry the London Association of the Medical Women's Federation desire to call attention to certain features of the questionaire which inevitably limited the scope of the inquiry and rendered the answers less informative than they could have wished. In the first place, it has been found impossible to elicit from the figures the average age of onset. This could only have been done by taking sample groups of girls and ascertaining which of them had begun to menstruate and which had not. The headmistresses considered that it would be injudicious to risk causing offence by questioning children who had not yet menstruated; hence in nearly all schools papers were only issued to girls known to have attained puberty. It is felt to be particularly unfortunate that no mention of *menorrhagia* was permitted on the questionaire, as many aspects of this condition call for further investigation. On *regularity* it was found difficult to get accurate answers in spite of explicit questions. The tendency was to express the intervals in weeks, although there was some doubt if this was strictly accurate. A very large number of girls kept no written record, but in comparison of the two groups there was less difference than might have been expected.

It will be noted that the degree and the duration of "pain" were not asked for. It is noteworthy, however, that only 61 stated that the pain was "bad" or "severe" or "much," and 700 explicitly stated that it was slight. It is remarkable to have ascertained that over 55 per cent. of schoolgirls have no pain or disability at all at a time when popular tradition pictures their lives as so profoundly affected by this physiological change. The apparently high percentage of pain should be read in connexion with the returns for absence. Experience teaches that if a girl has more than trivial or quickly passing pain she is not sent to school, yet the "absences" are extremely low and the habitual absences negligible. The whole picture presented suggests that the pain of menstruation is in the vast majority of cases slight and of very short duration and constitutes no serious interference with the girl's routine of life.

Some of the pain recorded occurred only "after" the period and in a small percentage "before, during, and after." There is much reason to suppose that such pain would not be truly of menstrual origin. There is a well-known tendency to connect any recurrent physical symptom in girls, especially abdominal pain, with this function, and most chronic appendices and obscure hepatic and digestive troubles get swept into the net.

From replies to Questions 8 and 10, the Commitee of Investigation received the definite impression that much of the discomfort complained of, and some of the disinclination to play games, was due to lack of appropriate toilet facilities and possibly of proper teaching in the hygiene of the period. The discomfort due to chafing may be just as severe a handicap on activity as actual dysmenorrhœa, but it is still true that at many playing fields and even in some schools no facilities for the necessary change are provided. There is no doubt that for this reason alone many girls refrain from active exercise during the period. A few mothers mentioned this difficulty specifically in returning the questionaires, and asked for improvements in the school arrangements. It would seem very desirable that any girl should be able to obtain a fresh towel and to dispose of a soiled one either at school or in the playing pavilion. Any traditional fear of washing should, of course, be removed if it still exists.

The question on exercise was not very happily worded, for unfortunately the questionaire did not

distinguish between free-standing and gymnastic exercises, although their effect on the menstruating girl is very different. Question 10 "Does she wish to (play games)? If not, what reason is given?" left room for an ambiguity not foreseen. Many papers answered "yes," but it appeared from Question 9 that the girl did not in fact play during the period! The reason why she did not was left obscure.

The committee would be glad to see the inquiry extended over the later years of adolescence and womanhood. It is important to ascertain, for example, what degrees of disability are present in girls at college and at work, what hygienic rules diminish such disability, and to what extent complete regularity of periods becomes established among normal women.

The members of the subcommittee responsible for this report are Dr. Christine Murrell (president), Prof. M. Lucas Keene, Dr. Lilian Jeffreys, Dr. Kate Platt, Dr. Ellen Pickard, and Dr. Letitia Fairfield (secretary).

## MR. GANDHI AND "THE LANCET."

UNDER the heading of Notes from India in our issue of March 8th, our India correspondent said:

"Whatever political agitators may say, and in spite of the growth of medical education in India, that country will need British doctors for a long time to come. Even Mr. Gandhi (who was himself operated on by a British surgeon in the I.M.S.) would probably admit the truth of this statement."

According to the *Sind Medical Journal*, Mr. Gandhi has replied as follows in the columns of *Young India*:

"The insinuation made by the writer in THE LANCET is baseless and vicious. At the time the operation was performed I was certainly a prisoner, but I was given the choice of having my own surgeon to perform the operation. I did not distrust Col. Maddock, the British surgeon referred to, and the late Dr. Dalal and Dr. Jivaraj Mehta (my surgeon and physician respectively) not having arrived in time, the operation was performed by Col. Maddock, whose care and attention I have acknowledged more than once. I have never felt the dearth of Indian surgeons or physicians of the highest calibre. Indeed, I have sent several of my European friends to Indian surgeons and physicians, and they have derived full benefit from the skill of these Indian medical men. It is in military science alone, thanks to the British policy, that India perhaps stands in need of assistance from European instructors. But so far as I am aware, in every other department, if the British withdrew, India could be self-contained without the slightest difficulty, and that in spite of open or veiled obstruction from the ruling caste."

Our India correspondent writes: "Mr. Gandhi's statement is correct. He asked for an Indian surgeon in the first place. He was wired for but could not come in time."

## TULARÆMIA IN THE LEMMING.

HITHERTO the lemming has been regarded mainly as a nuisance to farmers and a warning to the obstinate. Sweeping down in millions from the mountains to the farms surrounding the lakes and fjords, these fearless little black-and-tan rodents acknowledge no obstacle; when they meet a man, they express their opinion of him in terse squeaky barks instead of passing by on the other side in apologetic silence; and when they encounter a lake or fjord in their migrations, they swim it—or try to. The sequel is often the pollution of the Norwegian waterways with countless corpses. As Dr. T. Thjötta, of the Army Bacteriological Laboratory in Oslo, points out in *Tidsskrift for den Norske Laegeforening* for June 1st, the public in districts subject to lemming invasion has identified certain symptoms with this rodent, grouping them under the collective term "lemming disease." The reports of medical officers of health seem, indeed, to suggest that there are at least two diseases traceable to the lemming: a gastro-intestinal form caused by paratyphoid *coli* bacilli, and a glandular form. Thjötta has examined an example of the first form bacteriologically, but what is of more interest in connexion with the present world-wide study of tularæmia is his correlation of its manifestations with those of the glandular form of "lemming disease." They are, indeed, so like each other that, in his opinion, "one is fully warranted in identifying 'lemming fever' with tularæmia until the contrary has been proved." He has already demonstrated the existence of tularæmia in Norway among persons shooting hares or selling them in shops, and he has published 11 serologically proven cases. His first case was that of a medical man who, after shooting hares in the autumn of 1929, developed the ulcero-glandular form of the disease and was ill for months though still able to work. All, or nearly all, of the cases hitherto reported from Norway have been associated with hares, but as lice, flies, ticks, rats, and squirrels have been incriminated in one way or another in the propagation of this disease in other countries, it is probable that in Norway also its diagnosis in persons having no association with hares is only a matter of time. Dr. Thjötta's tentative inclusion of the lemming among the carriers of tularæmia will assuredly attract much material to his laboratory, and the forthcoming reports will be awaited with interest.

# Births, Marriages, and Deaths

## BIRTHS.

FOTHERGILL.—On June 22nd, at Ambleside, Westmorland, the wife of Dr. E. L. Fothergill, of a son.

MATTHEWS.—On June 23rd, at Newbridge-road, Bath, the wife of Dr. E. Russell Matthews, of a daughter.

SHARP.—On June 25th, at Welbeck-street, W., the wife of Dr. B. Buckley Sharp, of a son.

MAYBURY.—On June 6th, at Tulagi, British Solomon Islands, the wife of Lysander Montague Maybury, M.A., M.B., B.Chir., D.T.M. and H., of a son.

## MARRIAGES.

ANDERSON—HAYES.—On June 26th, at the Church of Our Lady of Dolours, John Keith Anderson, M.B., Ch.B., to Geraldine Juliana Gregg Hayes, L.R.C.P. Lond., M.R.C.S. Eng.

CAUTLEY—MEDWIN.—On June 24th, at St. Benedict's Priory, Ealing, Ronald L. Cautley, L.D.S. R.C.S. Eng., to Ena Lillie, younger daughter of Mr. and Mrs. John Medwin, of Ealing.

DEWES—NEVILLE-ROLFE.—On June 25th, at Flax Bourton, Gordon Cripwell Dewes, M.D. Camb., M.R.C.P., to Ione, eldest daughter of Captain Herbert Neville-Rolfe, D.S.O., R.N., and Mrs. Rolfe.

DOCKRAY—SANDS.—On June 25th, at Kinross East Church of Scotland, Edgar Dockray, M.B., Cobham, Surrey, to Margaret Maud, only daughter of David Sands, Esq., Kinross, formerly of Curityba, Brazil.

GLYNN—GIBSON.—On June 28th, at All Saints', Ennismore-gardens, S.W., Dr. Noel Trelawney Glynn, M.R.C.P., to Dr. Christine Gibson, daughter of Mr. and Mrs. H. Y. Gibson, of Duddingston House, Sunbury-on-Thames.

MACVICKER—BULTEY.—On June 28th, at St. James's, Piccadilly, George Colin Churchill MacVicker, B.A., M.R.C.S., L.R.C.P., to Joan Eleanor, second daughter of the late Mr. and Mrs. Ayerst H. Bultey, of Hampstead.

## DEATHS.

BERINGER.—On April 25th, at Kyoto, Japan, F. J. A. Beringer, M.R.C.S., L.R.C.P., aged 55, late Director of Medical and Sanitary Services, Sierra Leone.

GERVIS.—On June 30th, at Shepway, Seaford, Sussex, Charles Berkeley Gervis, M.D., M.R.C.S., L.R.C.P., aged 54.

PRANKERD.—On June 26th, at Hornsey-lane-gardens, Orlando Reeves Prankerd, M.D. Edin.

ROCKLIFFE.—On June 23rd, at Selioke, Hessle, Yorks, William Craven Rockliffe, M.A., M.D., aged 81.

SUCKLING.—On June 24th, at Wolverene, Cliftonville, Margate, John Jerome Suckling, M.B., B.S. Lond.

WILLIAMS.—On June 24th, at Caeronnen, Bangor, William Lloyd Williams, M.B., J.P., formerly of Llanberis, aged 75.

***N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages and Deaths.***

DIPLOMA IN TROPICAL VETERINARY MEDICINE.—The University of Edinburgh and the Royal (Dick) Veterinary College, Edinburgh, have decided to institute in October, 1930, a course for a diploma in tropical veterinary medicine. The institution of this course follows upon the suggestion made by the Lovat Committee on the Colonial Veterinary Service that adequate post-graduate training in this subject should be provided.